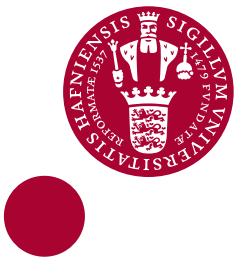

Between individual and group - exploring group members' information behavior in context

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Mellem individ og gruppe – en undersøgelse af gruppemedlemmers informationsadfærd i kontekst

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Abstract

The thesis has explored whether and how Kuhlthau's 6-stage-model of individuals' Information Seeking Process (ISP) may apply to the information behavior of group members in an academic setting. The underlying motivation has been an interest in investigating how existing models of information seeking behavior comply with the reality they seek to model. Two research interest have guided the thesis; the first one focusing on the characteristics of group member behavior, involving group members' activities, cognitive and affective experiences during the complex process of constructing a collective product (an assignment), whereas the second one was focusing on the factors affecting group member behavior, that is, the contextual, social and personal factors influensing group members' information behavior and problem solving in academic settings. The thesis and the theoretical foundation have been based on Allen's integrated 'person-in-situation'-approach. To explore group members' information behavior and problem solving as well as the impact from social, contextual and personal factors, two qualitative and longitudinal case studies were carried out in a group-based academic setting. Case study 1 was a preliminary case study carried out in 2002 and involving two groups of students (5 students); case study 2, involving three groups of students (10 students), was carried out in 2004/2005 based on the results from case study 1. Both case studies were based on a phenomenological approach and employed several methods to collect data on each group member's experiences, thoughts and reflections at three selected points in the assignment process: start, midpoint and end. The methods were a NEO-PI-R personality test (case study 2 only), demographic surveys, process surveys (case study 2 only), diaries and interviews. The results of the data analysis showed similarities between the ISP-model and the behavior of the individual group member, especially with regard to the information search behavior and cognitive experiences (focus formulation) during time. Many differences were also found, which turned out to be related to contextual, social and personal factors. The work task process was found to shift between We-modes (group) and I-modes (individual) with regard to focus formulation, information searching, relevance judgment, reading and writing – all constraining the work task performance process of finding a shared focus and constructing a collective product. The shifts occurred due to the existence of 'other work tasks' and the distribution of work task elements among group members. Hence, the work task process (stages) as experienced by group members differed from the conceptual work task

stages of the ISP-model. With regard to the information seeking process of the individual group member, it differed in accordance with the We-modes and I-modes of the work task process. In addition to this, search closure and the assessment of 'enough' information was not primarily motivated by cognitive factors associated with focus formulation, but rather motivated by factors associated with the work task. The ISP-model was also found to be sensitive to the group development process. Groups characterized as forming/storming groups experienced conflicts and difficulties in establishing a group identity, which resulted in difficulties regarding focus formulation and in negative affective experiences, even at the end - in contrast to the ISP-model. In turn, groups characterized as norming/performing groups generally formulated a focus and experienced positive feelings as well as low levels of uncertainty and frustration, even at the beginning of the ISP. These groups were found to be professionally and personally familiar with each other from the outset. The affective behavior of group members also differed from the individual in the ISP-model, simply because perceived feelings dynamically interacted with work task and group based factors. Affective experiences were for example found to relate positively to 'group member familiarity' and negatively to mis-matches in group members' approaches to group work. Hence, affective experiences may not solely relate to various information seeking activities according to point in process, but may as well be associated with factors deriving from the work task process and the group development process. Concerning the personal factors, similarities between other studies (e.g. Heinström) and the present study were identified, but also many differences that have stressed the importance of taken into consideration situational and contextual factors when behavior deriving from personality is investigated. Though social factors were found to affect the individual group member, intragroup members did not assimilate into a collective cognitive unit, simply because social factors (e.g. group conflicts), work task factors (e.g. the distribution of subtasks) and personality interfered. Thus, groups cannot be considered a priori to act as cognitive units consisting of similar collective representations. Rather, groups seemed to constitute of cognitive units dynamically interacting between an individual and a group level.

The conclusion of the thesis is that the ISP-model does not fully comply with group members' problem solving and information seeking behavior (activities and experiences). An extension to the ISP-model is proposed, the Group Member In Context (GMIC)-model, and it is further argued that academic work task performance is *even* more complex when it is performed in a group based setting.

Abstrakt

Denne afhandling undersøger hvorvidt og hvordan Kuhlthau's 6-stadie-model af individers informationssøgeproces (ISP) svarer til gruppemedlemmers informationsadfærd i en akademisk kontekst. Den underliggende motivation har været en interesse i at undersøge hvordan eksisterende modeller af informations- og søgeadfærd passer til den virkelighed de forsøger at modellere. To forskningsinteresser har guidet afhandlingen; den ene med et fokus på karakteristikken af gruppemedlemmers adfærd, forstået som de aktiviteter samt kognitive og affektive oplevelser der opstår i forbindelse med som gruppe at skulle udforme et fælles produkt (en projektopgave); den anden med et fokus på de faktorer der indvirker på gruppemedlemmers informationsadfærd og problemløsning i en akademisk kontekst (kontekstuelle (projektopgaven), sociale og personlige faktorer). Afhandlingen og det teoretiske fundament er baseret på Allen's integrerede 'person-in-situation'-tilgang. For at undersøge gruppemedlemmers informationsadfærd og problemløsning såvel som indflydelsen fra sociale, kontekstuelle og personlige faktorer blev der gennemført to længerevarende og kvalitative case-studier i en gruppebaseret og akademisk sammenhæng. Case-studie 1 var et forstudie, der blev udført i 2002 og involverede to grupper (5 studerende), mens case-studie 2 involverede tre grupper (10 studerende) og blev udført i 2004/2005, bla. baseret på resultaterne fra case-studie 1. Begge case-studier baserede sig på et fænomenologisk perspektiv og anvendte mange forskellige metoder med det formål at indsamle data om gruppemedlemmernes oplevelser, tanker og refleksioner på tre udvalgte tidspunkter i opgaveprocessen: start, midtvejs og til slut. Metoderne var personlighedstests (NEO-PI-R) (kun case-studie 2), demografisk skemaer, proces-skemaer (kun case-studie 2), dagbøger og interviews. Resultatet af dataanalysen viste ligheder mellem ISP-modellen og det enkelte gruppemedlems adfærd, specielt i relation til søgeadfærden og de kognitive erfaringer (fokus formulering) over tid. Mange forskelle blev imidlertid også identificeret, som viste sig at være relateret til kontekstuelle (projektopgaven), sociale og personlige faktorer. Opgaveprocessen viste sig fx at skifte mellem 'Vi-tilstande' (gruppen) og 'Jeg'-tilstande (individet) hvad angår formulering af fokus i opgaven, informationssøgning, relevansvurdering, læsning og skrivning – som til sammen indvirkede på processen med at finde et fælles fokus og udvikle et fælles produkt. Skift i tilstand skyldtes bla. indflydelse fra 'andre arbejdsopgaver' samt uddelegeringen af opgaveelementer blandt

gruppemedlemmerne. Opgaveprocessen som den blev oplevet af gruppemedlemmerne afvigede således fra de generelle opgavestadier i ISP-modellen. I forhold til det enkelte gruppemedlems informationssøgeproces viste den sig ligeledes at skifte i overensstemmelse med skiftet mellem 'Vi'- og 'Jeg'-tilstande i opgaveprocessen. Ydermere var stop i søgning og beslutningen om 'nok information' ikke primært relateret til kognitive faktorer, men snarere motiveret af faktorer i relation til projektopgaven (arbejdskonteksten). ISP-modellen viste sig også at være påvirkelig overfor gruppeprocessen. Grupper karakteriseret som 'forming/storming'-grupper oplevede konflikter og problemer med at få etableret en gruppeidentitet, hvilket resulterede i besvær med at formulere et fokus i opgaven samt i negative affektive oplevelser, selv til sidst i modsætning til ISP-modellen. Som kontrast oplevede grupper karakteriseret som 'norming/performing'-grupper positive følelser, også i starten af forløbet, og var i stand til at formulere et fokus. Det viste sig at hænge sammen med at medlemmerne i disse grupper kendte hinanden professionelt og personligt forud for gruppearbejdet. Gruppemedlemmers affektive adfærd afvigede også fra individet i ISP-modellen, som igen viste sig at være forbundet med opgaverelaterede og sociale faktorer. Affektive oplevelser viste sig bla. at relatere positivt til 'kendskab til gruppemedlemmer' og negativt til 'misforhold i gruppemedlemmmers tilgang til gruppearbejde'. Affektive oplevelser kan dermed ikke udelukkende henføres til forskellige søgeaktiviteter i relation til stadier i opgaveprocessen, men også til forhold der relaterer sig til selve opgaven (produktet) og gruppearbejdet. I forhold til de personlige faktorer blev ligheder fundet mellem dette studie og andre studier (fx Heinström), men også mange forskelle som har understreget behovet for at tage situationsbestemte og kontekstuelle faktorer i betragtning når adfærd bestemt af personlighed skal studeres. Skønt sociale faktorer viste sig at påvirke det enkelte gruppemedlem implicerede det ikke at intra-gruppemedlemmer assimilerede og voksede sammen til én kognitiv enhed, ganske enkelt fordi sociale faktorer (gruppekonflikter), kontekstuelle faktorer (fx distribution af opgaveelementer) samt personlige faktorer indvirkede. Grupper kan således ikke på forhånd siges at udgøre en kognitiv enhed bestående af ens vidensstrukturer. Grupper synes derimod at bestå af kognitive enheder der dynamisk interagerer mellem et gruppe- og et individniveau. Gruppemedlemmers problemløsnings- og informationsadfærd svarede dermed ikke helt til ISP-modellen. En udvidelse af ISP-modellen præsenteres, Group-Member-In-Context (GMIC)-modellen, og det konkluderes at akademisk opgave- og problemløsning må antages at være *endnu* mere kompleks når den udføres i en gruppebaseret sammenhæng.

Table of contents

List of figures

List of tables

1 Introduction

1.1 Motivation

While many different models of information seeking have been proposed (Case, 2006; Wilson, 1999), implicit in most of them is often the assumption that the information seeker is an individual, isolated from its situation and context. The cognitive viewpoint in information science, for example, has commonly focused on attributes of the *individual* to gain insight into the cognitive and emotional motivations for information behavior, thus ignoring the impact from other influences, such as social or contextual factors.
However, it is commonly recognized that information seekers often work in groups or in teams, which may as well affect their information behavior (e.g. Bruce et al., 2002; Foster, 2006; Hansen & Järvelin, 2005; Hertzum, 2000; 2002; Karamuftuoglu, 1998; Limberg, 1998; Prekop, 2002; Sonnenwald, 1999; Sonnenwald & Pierce, 2000; Talja, 2002). As demonstrated in these studies, the *social dimension* of problem solving results in various kinds of collaborative information behavior.
In addition, it has been found that the *contextual dimension* of problem solving, such as the work task situation, may also determine and influence the behavior of the information seeker (e.g. Byström & Järvelin, 1995; Ingwersen, 2001; Ingwersen & Järvelin, 2005; Lueg, 2002).

As pointed out by Wilson (1999, p. 267) in his article on models in information behavior research, one of the key questions for research is "*to what extent are the different models complete, or reasonably complete representations of the reality they seek to model?* Ignoring, for example, the social and contextual dimension of information (seeking) behavior models may result in research and development based on inadequate assumptions of information behavior and the relevant factors that should be taken into account when applied in *group-based settings*.

Motivated by this key question for research, the aim of the present thesis is to explore how existing models of information seeking behavior may apply to individuals engaged

in a group-based setting. More specifically, the Information Search Process (ISP)-model, developed by Kuhlthau's (1991), will form the basis of the exploration and the resulting extension of the model.

1.2 Objective of the thesis

The objective of the thesis is to explore and gain insight into the impact of social, contextual and personal aspects on individuals' information behavior and problem solving in group-based settings.

In this context 'group-based settings' refer to individuals acting in the role of group members, engaged in a collaborative problem solving process involving information (seeking) behavior. 'Social aspects' refer to the constraints associated with the group work situation, implying social psychology as well as social cognition, whereas 'contextual aspects' refer to the constraints associated with the work task, though it may be argued that the 'group work situation' has contextual importance to the individual group member as well (Ingwersen & Järvelin, 2005, p. 281). 'Personal aspects' refer to the personal constraints associated with the individual group member.

Based on the concepts, assumptions and strategies underlying Kuhlthau's ISP-model (Kuhlthau, 1991; 2004), the objective of the thesis is more specifically to *explore the impact of personal, social and work task factors on group members´ information activities and their cognitive and affective experiences during a project assignment.*

1.3 Research questions

Kuhlthau (1991; 2004) has developed a six-stage-model of the information seeking process[1] (ISP) that demonstrates the information seeker's constructive (learning) tasks and activities of finding meaning from information to extend his/her state of knowledge on a particular problem. The model is based on five longitudinal studies of individuals preparing an assignment in an academic setting (Kuhlthau, 1991; 2004).

[1] Though Kuhlthau (1991; 1993) calls the process the "information search process", "information seeking" is used here to express the broader scope of the model and to distinguish it from the commonly more narrow use of the word, "user-system-interaction".

The ISP-model consists of six stages: 1) Task initiation 2) Topic selection 3) Prefocus exploration 4) Focus formulation 5) Information collection 6) Presentation (implying seeking closure). The movement from one stage to another is caused by a series of choices regarding topic selection and focus formulation made through a complex interplay between three realms of activity: physical (the actions taken), cognitive (thoughts about the process and content) and affective (feelings experienced).

According to Kuhlthau (1991), the information seeking process is initiated by uncertainty resulting from a lack of understanding, a gap in meaning or a limited construction to solve a certain problem. This will change over time concurrently with the seeker getting information and constructing meaning to solve the problem[2]. During the initial stages of the information seeking process the information seeker is commonly feeling confused, frustrated and in doubt; in the final stages he or she is commonly feeling satisfied, confident and relieved. 'Focus formulation' represents the *turning point* of the ISP where feelings of uncertainty diminish and confidence increases. The task here is to form a focus from the information encountered. At this point and throughout the rest of the process, information seeking typically starts to decrease whereas writing starts to increase, also signifying that the information seeker has started entering the 'presentation' stage. The presentation stage implies 'seeking closure', where the task is to complete the search and prepare to present or otherwise use the information collected.

While the ISP-model has contributed to our understanding of factors affecting the information seeking process and has formed the basis of many, also recent, research projects and studies of individuals' processes of construction (e.g. Attfield & Dowell, 2003; Byron & Young, 2000; Cheuk Wai-yi, 1998; Heinström, 2002; Holliday & Li, 2004; Kracker, 2002; Kracker & Wang, 2002; Limberg, 1998; Vakkari, 2001; Warner & Procaccino, 2004), no prior study has employed the ISP-model to describe and understand information behavior and the process of construction from the perspective of the *individual acting as group member*.

In this context, two assumptions inherent in the ISP-model has formed the basis of the research questions:

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[2] The information seeking process should, however, not be understood as a strictly line but as an *iterative* process towards a clearer and more focused perspective.

1. The assumption that the information seeker and problem solver is an individual whose activities and cognitive and affective experiences almost solely are associated with information seeking at various stages of the ISP.

2. The assumption that a natural relation exists between end of seeking (search closure) on the one side, and problem solving and positive feelings, such as certainty and satisfaction, on the other.

As stated above, other factors, besides the attributes of the individual, may interfer when the individual as a group member and the work task dimension is taken into account. However, instead of focusing solely on the social aspects of the ISP-model, both sides, the individual *and* group, should be taken into account, hereby demonstrating an integrated view on problem solving and information behavior. This also explains the title of the thesis and its emphasis on the 'individual group member'.
From the research problem outlined above, two main research interests form the basis of the present thesis: 1) *group member behavior* and 2) *factors affecting group member behavior*.
Research interest 1 consists of two research questions (1a-1b) and research interest 2 consists of three reseach questions (2a-2c), which are presented below.

To explore the impact of social and contextual factors on group members' information behavior, the *information behavior* of the individual *group member* should initially be mapped and compared with the information behavior of the individual in the ISP-model. This is guided by the first research question:

1a. *Will group members behave differently from the individual modeled in the ISP-model? If so, in which way do they behave and why?*

Associated with an affirmative answer to question 1, it may turn out that the behavior of group members either differ or tend to assimilate during time. If the latter is the case, we may then speak of the group as an entity or another kind of individual in its own right. This leads to the second research question:

1b. *Will intragroup-members demonstrate different activities as well as different cognitive and emotional experiences? If so, in which way do they differ and why?*

The next three research questions regard the *factors* associated with group members' information behavior – and why they act as they do - which in this context refer to contextual, social and personal factors:

2a. *How is group member behavior related to contextual factors (work task)?*

2b. *How is group member behavior related to social factors (group work)?*

2c. *How is group member behavior related to individual factors (personality)?*[3]

According to Talja, Keso & Pietiläinen (1999) we tend to focus on the objects rather than their grounds, e.g. focusing on individuals rather than the contexts in which they are imbedded. In this way, the factors above may be seen as examples of influencing and interacting contexts that should be taken into account to more fully understand group members' information behavior.[4]

1.4 Methodological framework

This section describes *in short* the methodolocial framework of the thesis, that is, the theoretical and empirical framework associated with the two research interests *information behavior* and *factors associated with group members' information behavior*. A detailed description of the theoretical framework is presented in chapters 2-6, serving both as an argument for and an introduction to the empirical foundation of the thesis presented in chapters 7-8.

[3] The last question has been formulated as a result of a preliminary case study (Hyldegaard, 2006) in which personality seemed to affect group members' activities as well as cognitive and emotional experiences.

[4] In this thesis, however, 'context' and 'contextual factors' have been restricted to the *work task*, while the other factors are referred to as dimensions, such as the social and the personal dimension of information behavior.

1.4.1 Wilson's model of information behavior

As part of the underlying theoretical framework, Wilson's conceptualization and 1996 model of information (seeking) behavior has been used to frame the understanding of and reflect upon problems associated with *human information behavior* (Wilson, 1999; 2005). It is a model of macro-behavior (1999, p. 257), but may also serve as a source of hypothesis and research.

In addition to various research fields or levels constituting information behavior, the 1996-model operates with *intervening variables*, that is, the supportive as well as preventive impact on information behavior. According to this (Wilson, 1999; 2005), both personal (individual), social and environmental factors are acknowledged as variables that may help understand and explain human information behavior, in this case group members' information behavior. Wilson's conceptual model is further described in section 2.1.1.

1.4.2 Allen's integrated 'person-in-situation-behavior'-model

To 'situate' the *individual group member*, Allen's (1996; 1997) 'person-in-situation' behavior model has been used, according to which individual and social variables are combined into an integrated model, thus representing an *integrated view* on the individual's problem situation.

The focus of the model is on individuals' information needs, but as pointed out by Allen (1997, p. 121), a unified and coherent understanding of information needs can only be obtained as researchers consider the *problem situations* that give rise to needs and the *information seeking behaviors* that resolve those needs, in terms of interactions between personal *and* situational variables. This will require more complex research designs, and more sophisticated data analysis, than those studies that simply focus on individual *or* situational variables. Information needs are, however, not addressed explicitly in the present study but is addressed here, as the underlying conceptual framework in the model may serve as a guide to understand group members' *information behavior*.

According to Allen (1996; 1997), information needs are explanatory constructs that are determined by certain goals, purposes or objectives, explaining why people behave and act as they do. Investigating information needs, two research traditions have dominated in LIS, that is 1) research focusing on *individual differences* among users - regardless of the situation in which the individual is found and 2) research focusing on *information needs of groups of users* and how they e.g. experience needs for information. As stated

by Allen (1996; 1997), there has been a great divide between the two approaches but, as he argues, *both* personal and situational variables interact in generating information-related behavior and therefore should be integrated. The integrated view proposed by Allen (1997) is shown in Figure 1.1.

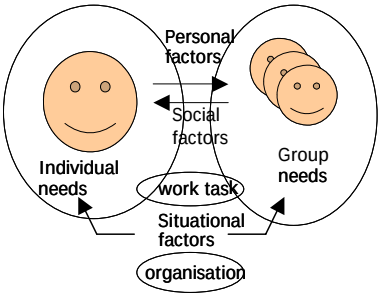

FIG. 1.1. The 'person-in-situation' behavior model.
(modified after Allen, 1997, p. 112)

The integrated view in the 'person-in-situation' behavior model represents four approaches to information needs: the *cognitive*, the *social*, the *social-cognitive* and the *organizational approach*.

The *cognitive approach* addresses the relation between individual influences and individual behavior ('individual needs' and 'personal factors'). It seeks to explain behavior by reference to what people think and know and the cognitive processes involved in thinking, learning and problem solving.
The *individualistic* cognitive viewpoint in information science is further described in section 2.2, focusing on the theoretical framework and studies derived from that approach, e.g. Kuhlthau's ISP-model.

The *social approach* addresses the relation between situational influences and individual behavior ('individual needs' and 'situational factors'), emphasizing the social embedment of the process of defining and meeting needs: "…Since people are always embedded in social situations, it is sometimes difficult to distinguish clearly between the influences on information seeking behavior that are individual and those that are social" (Allen, 1997).

The social approach in information science is further described in section 2.3, focusing on the *collaborative* dimension of information behavior as shown in a number of studies based on the social approach.

The *social-cognitive approach* addresses the relation between individual influences and group behavior and the collective nature of information needs (‘personal factors’ and ‘group needs’). A group may have information needs that go beyond the individual information needs of its members. The group needs do not replace the individual needs; rather, group and individual needs may occur concurrently (Allen, 1997).
The social-cognitive approach is further described in section 2.4, focusing on the *interactions* between ‘individual’ and ‘group’.

The *organizational approach* addresses the relation between situational influences and group behavior (‘group needs’ and ‘situational factors’). Just as individual influences can affect how a group perceives problems and deals with them in a variety of ways, including information seeking, so also groups can be influenced by their larger situational and social context. ‘Situational factors’ involve both the ‘work task’ and the ‘organisation’ (or environment). This are often referred to as *contextual* factors, but in Allen’s integrated view, no distinction is made explicitely between context and situation. We distinguish, however, between these concepts, which are further described in section 2.5 and demonstrated in the ‘holistic cognitive viewpoint’ in the same section.

Irrespective of perspective or point of departure, that is, individual or group, personal, social and situational factors influence information behavior interactively. The charateristics of the influencing factors, however, change as the focus shifts from individual to group needs (or behavior). Each type of need is addressed by Allen (1996; 1997) as a separate entity with its own inner or outer influencing factors which can be explained by integrating the four approaches.
In this context, the group member is considered an individual affected by his/her inner cognitive influences (the personal factors) as well as by the influences from the other group members (the social factors). The latter may be called a social ‘with-in-factor’ from the perspective of the individual group member. At the same time, the individual as well as the group may be influenced by ‘outer-factors’ such as the work task situation or the organization (the situational factors).

This integrated view of the *situated* individual has been applied to help explore and understand the individual '*group member-in-situation behavior'* over time.

1.4.3 Kuhlthau's ISP-model

Besides being part of the research object and, thus, introduced in conjunction with the research questions, Kuhlthau's ISP-model also forms part of the theoretical framework. It is presented and discussed in relation to the individualistic cognitive viewpoint in information science.

According to the ISP-model, information seeking is a goal oriented *process* of meaning construction, initiated and driven by uncertaincy in relation to a problem at hand. Information seeking behavior is motivated by cognitive and affective factors, which dynamically change over time. (Kuhlthau, 1991). The ISP-model has been developed from various studies in academic settings in which the problem at hand, the work task, was a project assignment. Though the ISP-model was later tested by Kuhlthau in a work domain (Kuhlthau, 2004), only the theory generated from the test and employment of the ISP-model in an *academic setting* will be used in the development of the research design. However, previous studies based on the ISP-model - both in an academic and professional setting - will be taken into account in the discussion of the ISP-model, serving also as an argument for the present study of group members' information behavior. The ISP-model is further described in section 2.2.2.

1.4.4 Factors associated with group members' information behavior

The factors under exploration in relation to the ISP-model are 'work task', 'group work' and 'personality'. Each factor has been addressed in a chapter each, focusing on aspects relevant to the research focus.

The chapter on *work task* addresses the contextual aspect of information behavior, that is, the conceptualization of task based information behavior, the work task phenomenon and its characteristics in association with the assignment. The aim is to stress the complexity of the work task and its relation to information behavior, hence also the importance to group members' information behavior. Especially, the conceptual framework by Byström & Hansen (2005) and the work by Byström & Järvelin (1995) and Vakkari 2001) will be taken into account.

The chapter on *group work* addresses at a general level the concept and constitution of group work, e.g. the group as a problem solving unit, and the concept of cooperation and collaboration. At a specific level, group work in an academic setting is addressed. The aim is to point to the characteristics of group work and the constraints that may follow from group work in academic settings with regard to information behavior.

Finally, the chapter on *personality* focuses on the concept of personality and personality factors in relation to information behavior. Personality is associated with the individual and, hence, may help explain activities and experiences experienced by the individual group member. Especially, the work by Heinström (2002) will be taken into account here.

1.4.5 Two case studies

To explore the impact of social and contextual factors on group members' information behavior and problem solving, two qualitative and longitudinal case studies have been carried out in a group-based educational setting of students. Case study 1 was a preliminary case study, carried out from April to May 2002, involving two groups of students; case study 2, involving three groups of students, was carried out from October 2004 to January 2005, based on the results from case study 1. Both studies were conducted at the Royal School of Library and Information Science.

The research design was to a large extent in accordance with the research design used by Kuhlthau (1991) to develop the ISP-model. This means that many of the methods and strategies used by Kuhlthau also were employed in the two case studies. In addition, the employment of various methods also served as a way to triangulate and help validate the data. The research design, however, differs slightly between case study 1 and 2 due to the results in case study 1.

Though the ISP-model shows the process of construction, the focus in both case studies has been on the individual and situated group member's *behavior* during construction, that is, his/her *perceptions* and *experiences* associated with activities, cognition and emotion during a project assignment. Hence, aspects associated with 'learning', e.g. the outcome of group-based information behavior and 'learning tasks', has not been central to this study and therefore has not been addressed specifically in the two case studies.

To help understand behavior from a group member perspective, a *phenomenological* approach has been applied as metatheory when collecting and analyzing data - hereby

taking into account also the individual group member's horizon and lifeworld. In accordance with a phenomenological approach, Dervin's (1983) *Sense-Making approach* was used in case study 2 as a research tool to get out participants' feelings, thoughts and experiences in relation to various situations and phenomenons during the project assignment. More specifically, the micro-moment time-line interview technique was employed. The Sense-Making approach is further described in section 2.2.3.

Figure 1.2 below is a conceptual model showing the focus and levels of analysis of the research as well as the relation between the two case studies that form the empirical foundation of the thesis (case study 1 and case study 2) [5]. In both studies - of longitudinal nature - the focus is on the *individual* and *situated group member* (I) and his or her interaction (↔) and experience with the group (G) and the work task (W) during time (T). The focus on the individual is indicated by a bold circle which will change in accordance with the group member in focus. The bold arrow indicates dynamics between the three levels of analysis or dimensions which should be further explored: *Individual* (personal), *Group* (social) and the *Work task* (contextual). As indicated in the model, the results from case study 1 (C1) both forms the basis of the design (D) as well as the analysis (A) of case study 2 (C2).

[5] The legends have been assigned to case study 2 in the figure but hold for case study 1 as well

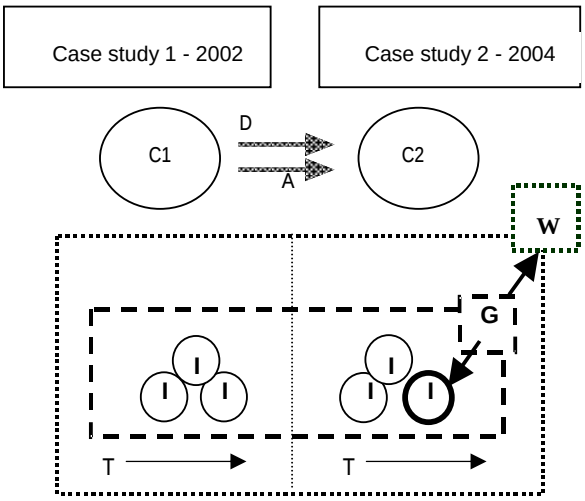

FIG. 1.2. Conceptual model of the research :

Focus, levels of analysis and relation beween case study 1 and case study 2

1.5 Contribution

The insight gained from exploring the impact of social and work task related aspects on group members' information behavior may contribute to a new *understanding* of how to *research, develop* and *serve information behavior in group-based educational settings.*

If the individual group member behave differently from the individual in the ISP-model, it may be demonstrated in which way existing *models of information behavior* should be adjusted or supplemented to take into account also the behavior of individuals in group-based settings.

The thesis may also provide insight into the characteristics of 'students being group members' as a specific type of user that may help generate a user profile to be used in *design and evaluation of information systems.* As pointed out by DELOS (2006) in relation to the EU-digital library in 2010, there is a need for both individual and group oriented user profiles. These group oriented user profiles may also be used for personalization purposes in order to deliver and give access to appropriate and relevant content and services.

Finally, the outcome of the thesis may contribute to the mediation between group members' information needs and relevant content. Given that the thesis provides insight into the information behavior and problem solving of group members engaged in a

project assignment, this knowledge may be used by *mediators* – a librarian or a user interface – to help students during a project assignment.

1.6 Structure of the thesis

The structure of the thesis falls into two parts, a theoretical and an empirical. After the introduction follows the theoretical part, composed of four chapters. Chapter 2 presents and discusses various *approaches to information (seeking) behavior* which differ according to whether the focus is on the individual (the cognitive approach), the group (the social approach), the individual-group interaction (social-cognitive approach) or the context. The chapter leads up to the integrated view of information behavior, taking into account both individual, social, individual-social and contextual aspects. The chapters 3 – 5 addresses the *factors* associated with group members' information behavior which in this context refer to contextual, social and personal factors. Hence, chapter 3 focuses on task based information behavior and the concept of work task, especially related to the work task in academic settings; chapter 4 focuses on aspects of group work and group-based problem solving, especially related to group work in academic settings; and chapter 5 focuses on aspects related to personality, especially in relation to information seeking. Chapters 2-5 lead up to and provide background information for exploring the main object of the thesis, the individual group member in context. The empirical part is presented in chapters 6-8. These chapters describe the methodological framework and research design of two case studies, case study 1 and 2. Chapter 6 presents the *methodological framework* and an introduction to the two case studies. Chapter 7 presents the research design and results of *case study 1*. In addition, the results of case study 1 is discussed, leading up to the research design of the main case study, *case study 2*, presented in chapter 8. The results of case study 2 is presented in chapter 9, taking into account the results from case study 1 as well. Chapter 10 discusses the significance of the results from case study 2 - and across the two case studies - in relation to the five research questions. Finally, chapter 11 concludes on the results and presents the Group-Member-In-Context (GMIC)-model as well as the methodological contributions to information behavior research and suggestions for future work.

2 Approaches to information behavior

This chapter presents and discusses four approaches to information behavior, which are determined by the research object in focus. Section 2.2 on *Cognitive approaches* covers those approaches that examine and focus on the individual as the main driving force behind information behavior while section 2.3 on *Social approaches* addresses those that focus on the social and collaborative dimension of information behavior. The *Socio-cognitive approach* in section 2.4 goes beyond the individual-social dichotomy and focuses on the interactions of human social behavior, hence highlighting the distinction and the interrelation between individual and group. The last section 2.5 on *Information behavior in context* addresses the concept of context and situation in association with the study of information behavior.
The chapter leads up to an integrated view of information behavior, taking into account both individual, social and contextual aspects during the information seeker's constructive process of problem solving.

Some theories and models of information behavior also form part of the underlying *methodological* framework of the thesis (theories and methods) and have been presented in separate sections:
Section 1.1 - 1.2 presents two *conceptual models* of information behavior that serve as part of the underlying theoretical framework of the thesis and guide the understanding of information behavior as well as of the situated group member. This is the models proposed by Wilson (1999) and Allen (1997).
Kuhlthau's (1991) *ISP-model* both forms part of the research focus and the methodological framework, hence, this model and its underlying methodology has been thoroughly described and discussed in section 2.2.2.
In section 2.2.3, Dervin's (1983) *Sense-Making-approach* is presented.

2.1 Two conceptual models of information behavior

"A model may be described as a framework for thinking about a problem and may evolve into a statement of the relationships among theoretical propositions" (Wilson, 1999, p. 250).

2.1.1 Wilson's model of information behavior

According to Wilson (1999, p. 249), information behavior "…is those activities a person may engage in when identifying his or her own needs for information, searching such information in any way, and using or transferring that information". Having analyzed a number of key models on information (seeking) behavior, Tom Wilson (1999) has proposed a nested model of research fields that seeks to cover each of the specific models analyzed and their accompanying phenomenon in focus.

As shown in Figure 2.1 of the nested research fields, information behavior constitutes the general level. *Information seeking behavior* constitutes a subset of information behavior, particularly concerned with the variety of methods people employ to discover and gain access to information, whereas *Information searching behavior* constitutes a subset of information seeking behavior, particularly concerned with the interactions between information user and a computer based information systems.

FIG. 2.1. Wilson's nested research model of information behavior.

(Wilson, 1999, p.263)

Based on his nested view on information behavior research, Wilson (1999; 2005) has developed a general model of information (seeking) behavior that may help frame an

understanding of and reflect upon problems associated with *human information behavior*. The 1996-model in Figure 2.2 is a revision and expansion of his earlier models from 1971 and 1981, drawing upon research from a variety of fields other than information science, including decision-making, psychology, innovation, health communication and consumer research. As pointed out by Wilson (2005), it is necessary, however, to understand the relationships among the various diagrams and models leading to his general model of information behavior; thus, these should also be taken into account when using the model to guide the development of research ideas. In Wilson's view, the 1996 model is a model of methodology showing behavior at a macro-level rather than a model of a set of activities or a situation (1999, p. 257; 2005, p. 57) [6]. The inclusion, though, of other theoretical models of behavior makes it a rich source of hypothesis and further research.

[6] Wilson's remark concerning the interrelationships of his diagrams and models as well as the remark about the macro-level of the 1996-model may be a reply to the critique of the model proposed by Niedzwiedzka (2003) based on her experiences from a study of information behavior among health care managers and policy makers. According to this, the model turned out to be too general and insufficient as conceptual framework, e.g. lacking the mediator function, the activity of decision making as well as ignoring the intervening variables and contexts of needs as important factors throughout the whole information acquisition process.

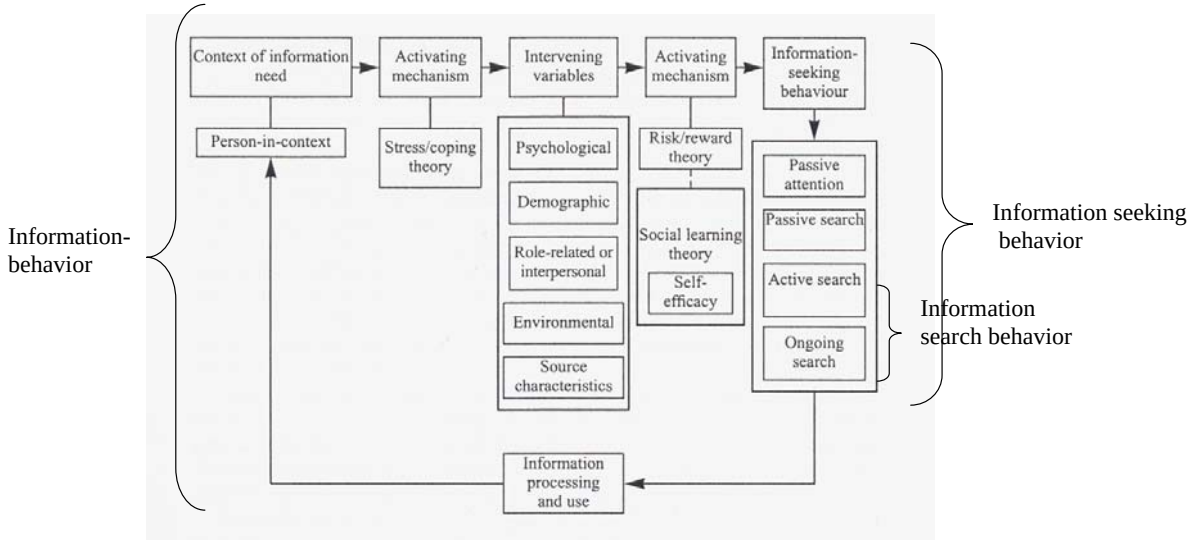

FIG. 2.2. Wilson's 1996 model of information behavior
(Wilson, 1999, p. 257).The author has added the associating research fields

According to the model, and in accordance with his 1981-model, the *person in context* is the focus of the model. Information seeking behavior arises as a consequence of an information need perceived by the person. The information need, however, is not the primary need, but arises out of a need of a more basic kind, that is physiological (e.g. needs for food, water, shelter), cognitive (e.g. needs for planning, learning) or affective (e.g. needs for entertainment, for domination)[7]. These categories of needs are interrelated in that physiological needs, for example, may trigger cognitive and affective needs and cognitive needs may result in affective needs. Based on this, he suggests that the phrase 'satisfying an information need' is changed into speaking of 'information seeking towards the satisfaction of needs' (Wilson, 1981, p. 8)

The context of (or factors influencing) any of these needs may be the *person himself* (the psychological and demographic characteristics), a *social role* due to the person's work or life, or the *environments* within which work or life takes place (political,

[7] The three contexts of needs are part of Wilson's model originally used in 1971 and published in an article from 1981: Wilson, T.D. (1981). On user studies and information needs. *Journal of Documentation*, 37(1), 3-15. The 1971model is an elaboration of the 'person in context' boxes in the 1996 model (Wilson, 2005).

economical, technological etc.). Like the three types of needs mentioned above, these contexts intertwine; sometimes they condition each other. As shown in the model, the intervening variables in the model, that is, the barriers or supporters to information seeking behavior and information use, arise out of the same three contexts and in addition to the context of information source characteristics, such as accessibility and credibility (Wilson, 1997). Though the intervening variables are shown only at one point in the model, some of them may also intervene between context and the activating mechanism, between the activating mechanism and information seeking behavior and between information seeking behavior and information processing and use.

As shown in the model, *information seeking behavior* results from various activating mechanisms and intervening variables. The form or strategies of information seeking behavior may be either passive or active, implying an information system (mediator and/or technology) or demands upon other sources (e.g. personal) (Wilson, 1981). The *passive* seeking behavior refers to 'passive attention' and 'passive search', where the first mode means passive absorption of information from environment whereas the second mode means those occasions when a particular type of behavior results in acquisition of information that happens to be relevant to the individual. The *active* seeking behavior covers 'active search' and 'ongoing search', where the first mode takes place when a person actively seeks out information and the second mode takes place when a search is continuously carried out to update or expand the area of information. As demonstrated in the model, *information searching* only relates to the active and targeted search elements in the model, implying interactions between information user (with or without intermediary) and a computer-based system. It corresponds well to the concept of interactive IR, here distinguished from the narrow laboratory model of IR ignoring the user in context (Ingwersen & Järvelin, 2005). However, what the information seeking part of the model is concerned, no feedback loop signifying interactivity is indicated, neither in this model, nor in the detailed model from 1981. According to the latter model (Wilson, 1981, p. 4), information seeking behavior associated with information systems and other sources may, for example, result in a 'failure' mode. No direction, though, or way to help the information seeker overcome this 'dead end' situation is given. In this way, the model fails to fully address the importance of the interactive part of information seeking behavior. This has resulted in a slight modification of Wilson's information seeking box, adding an arrow to

indicate the *interacting* nature of information seeking from an information seeker oriented point of view. This is shown in Figure 2.3.

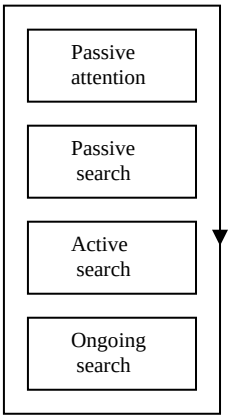

FIG. 2.3. The information-seeking box of Wilson's general model (1999), modified by an arrow indicating interactivity

To further understand Wilson's concept of information seeking behavior, his model from 1981 of 'information seeking paths' (Figure 2.4), which underlies the information-seeking box in the general model, is presented here.

According to Wilson (1981, p. 5), the model may be seen as a reply to the many studies of information needs failing to consider the impact of the contexts framing the investigation of information needs.

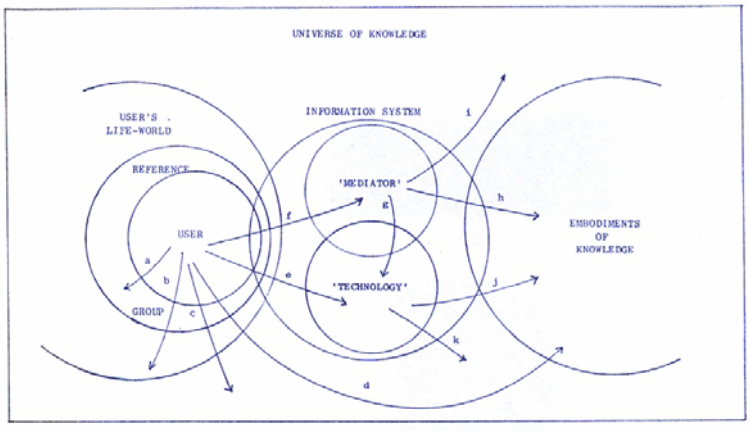

FIG. 2.4. Wilson's model of information seeking paths in context. (Wilson, 1981, p. 6)

Though difficult to express and model the interactions of the complex 'real world' and abstract world, the model shows the 'information user' (or information seeker), centred in his or her life-world, which is defined as "…the totality of experiences centred upon the individual as an information user" (Wilson, 1981, p. 6). Within this 'life-world', the world of work may be seen as one important sub-world associated with various 'reference-groups' with which the user identifies. This may, for example, be a fellow professional, a peer group within an organisation, group and team members or a supervisor. The user may be in contact with a variety of 'information systems', which cover two subsystems as shown in the model: either a human 'mediator' (or imbedded in a digital information system (which is the overlapping field) or 'technology' which means whatever combination of techniques, tools and machines that constitute the information searching subsystem. The information system may have access to various 'embodiments of knowledge', being documents or people. The lettered paths in the model show some of the possible search paths an information seeker – either end-user or on behalf of one - may choose to search for information in order to satisfy a need and solve a problem. The paths do not cover all possible search paths, but have been concentrated to four relevant categories: Category 1-paths (paths a-d) addresses search strategies by a user, independent of any information system (mediator or technology); Category 2-paths (paths e-f) addresses search paths involving an information system; Category 3-paths (paths g-i) covers strategies employed by a mediator to satisfy a need; Category 4-paths (paths j-k) addresses strategies employed by a sophisticated technology on behalf of either the user or an mediator. These various search paths also demonstrates different types of information seeking strategies to be used in problem solving. However, it may be argued that the embodiment of knowledge has been associated *too* narrowly with the employment of a formal information system. The use of ones reference group (path a), for example, may as well result in *new* information. The concept of information seeking used in the present study does not distinguish between formal and informal information systems; both types are seen as embodiments of knowledge that may serve the user with new information to help satisfy a need.

Finally, the information processing and use element in the 1996 model refers to the situation when the information, obtained by the user, is processed and becomes part of the person's knowledge. Then it may be used directly or indirectly to influence the environment and create new information needs. This part of the model is understood as *information behavior* in the narrow sense, meaning the specific kind of behavior that is

neither covered by information neither seeking nor information search behavior. In the broad sense, as used here, the concept includes all the elements shown in the model.

In addition to the various elements and research fields constituting information behavior, Wilson (1997; 1999; 2005) has suggested incorporating analytical concepts, models and theories from disciplines outside information science. Hence, the employment of theories on stress/coping, risk/reward and social learning may, for example, help explain the relationship between the intervening variables and specific forms of behavior.

Wilson's general model of and approach to information behavior presented here will constitute the concept of *information behavior* employed and referred to as part of the underlying theoretical framework of the thesis - including the minor modification of the information seeking part of the model. Besides enabling the incorporation of various models of information behavior, the model recognizes the importance of personal (individual), social as well as environmental factors to explore human information behavior. In addition, as a result of the information behavior terminology introduced in the model, we may speak of various information seeking tasks (strategies and passive/active search behavior), search tasks (active searching behavior) and use tasks (end of seeking behavior), which are distinguished from the concept of 'work task' addressed in chapter 3. However, since the focus in the present work is less on explaining specific forms of behavior than on *exploring* behavior and factors affecting information behavior in group based settings, the specific theoretical part of the model will not be applied.

2.1.2 Allen's integrated 'person-in-situation-behavior'-model

Bryce Allen (1996; 1997) has developed a 'person-in-situation-behavior'-model, according to which individual and social variables are combined into an integrated model, thus representing an *integrated view* on the individual's problem situation that may help understand the *situated* individual group member.

The focus of the model is on individuals' information needs, but as pointed out by Allen (1997, p. 121), a unified and coherent understanding of information needs can only be obtained as researchers consider the *problem situations* that give rise to needs and the *information seeking behaviors* that resolve those needs, in terms of interactions between

personal and situational variables. According to Allen, and in line with Wilson (1981; 1999), information needs may be motivated by many other factors than to get the mere information. When we watch TV, for example, we may engage in that activity to know what is going on the world, to get entertained or to get company. Information needs are not addressed explicitly in the present study, but the underlying conceptual framework in the model may serve as a guide to understand group members' *information behavior*.

According to Allen (1996; 1997), information needs are explanatory constructs that are determined by certain goals, purposes or objectives, explaining why people behave and act as they do. Information needs occur in many different situations and there are many ways that people experience information needs. Given that *people are simultaneously individuals and members of groups* (Allen, 1997, p.112), we may distinguish two types of information needs – those that occur at the individual level and those that occur within groups of various kinds. An individual information need may for example be a recipe to prepare a guest dinner, whereas a group need may be a collective information need due to a common goal. Both type of needs are influenced by *personal* and *social factors* as well as *situational factors* (outer context). The way people behave at any point in their lives is constrained by their individual knowledge levels, abilities and personal styles and characteristics. At the same time, peoples' behavior is constrained by their memberships of various groups such as families, friends, colleagues etc. or by the situational factors associated with the work task or the environment.

Investigating information needs, two research traditions have dominated in LIS, that is 1) research focusing on *individual differences* among users (e.g. Belkin, 1978; Ingwersen, 1992; Taylor, 1968). Regardless of the situation in which the individual is found there are individual variables that influence how a person acts and 2) research focusing on *information needs of groups of users* and how they e.g. experience needs for information (e.g. Prekop, 2002; Sonnenwald, 1999; Sonnenwald & Pierce, 2000; Talja, 2002). According to this tradition, social and situational influences on information needs have a profound effect on people's information seeking behavior.

As stated by Allen (1996; 1997), there has been a great divide between the two approaches but, as he argues, both personal *and* social/situational variables interact in generating information-related behavior and therefore should be integrated. The integrated view or perspective of the 'person-in-situation-behavior' proposed by Allen (1997) is shown in Figure 2.5.

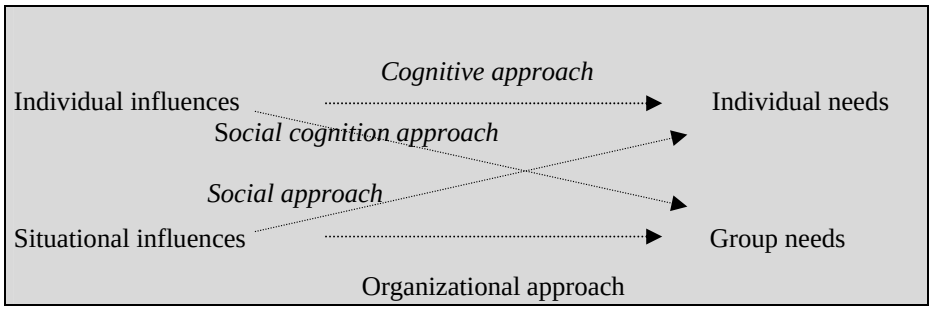

FIG. 2.5. The integrated perspective of the 'person-in-situation-behavior'.
(Allen, 1997, p. 112)

The integrated view of the 'person-in-situation-behavior' represents four approaches to information needs: the *cognitive*, the *social*, the *social cognitive* and the *organizational approach*.

The *cognitive approach* addresses the relation between individual influences and individual behavior. It seeks to explain behavior by reference to what people think and know and the cognitive processes involved in thinking, learning and problem solving.

The basic idea of the cognitive perspective is that two people in the same situation will experience information needs differently determined by their different knowledge structures and perceptions of the situation. An information need may occur whenever there is a failure (break down) of the individual's knowledge needed for each level of the problem-solving model. This is often referred to as 'the gab' (Allen, 1996; Belkin, Oddy & Brooks, 1982; Dervin, 1983; Ingwersen, 1992), here understood as "…instances in which knowledge structures fail to indicate an appropriate course of behavior or action of an individual" (Allen, 1996). From a sense-making perspective (Dervin, 1983) we may also say that the individual is placed in a situation in which making sense fails. Peoples' state of knowledge affects their perception of problem, generation of alternative courses of action and the selection of alternative courses of action to resolve the problem.

The *social approach* addresses the relation between situational influences and individual behavior, emphasizing the social embedment of the process of defining and meeting needs: "…Since people are always embedded in social situations, it is sometimes difficult to distinguish clearly between the influences on information seeking behavior that are individual and those that are social" (Allen, 1997).

The basic idea with the social perspective is that two people with different backgrounds will behave similarly in the same situation. Hence, focus on the social context is emphasized whereas the focus on individual differences and their influence on the individual's behavior are minimized. The social context is important here when people perceives problems. The situation provides a context that constrains the use of knowledge structures in perception, and that contains sources of information in terms of social knowledge that can overcome failures of perception. Situational and social factors, particular social values, also determine to some extent the different sets of alternative actions and selection of course of actions/behavior that are understood to be present when considering what to do in a specific situation. Since information seeking techniques and strategies are interacting, success and failures in this approach can only be judged by the reaction provided by the social context – or by observing others in similar situations. The need for cognitive closure – or 'gab closure' - may for example vary because of factors in the social situation. Inappropriate social factors such as breaking or lacking knowledge about social norms, may influence the individual's information seeking and result in seeking help from an expert or an intermediary. In this way, the individual´s knowledge structures that can be applied to solve a certain problem are constrained by the problem-solving situation; at the same time, the situational context may provide opportunities to learn about the problem leading to a transformation of individual knowledge structures. According to Allen (1996), confidence of cognitive closure results in less information seeking, which is in line with Kuhlthau (1991).

The *social-cognitive approach* addresses the relation between individual influences and group behavior and the collective nature of information needs. A group may have information needs that go beyond the individual information needs of its members. However, the group needs do not replace the individual needs; rather, group and individual needs may occur concurrently (Allen, 1997).

In group learning or group problem solving, group information needs may occur that are quite different from individual information needs. The group process is crucial in this respect and may affect the outcome as well. Both individual and social influences may determine the nature of collective information seeking behavior. According to Allen (1996), individual factors in this approach differ from those that influence individual behavior, meaning that in group based settings, individual factors are 'with-in-group'

influences or factors *internal* to the group whereas factors *outside* the group are considered as social influences. The group is in this respect considered as an entity or cognitive agent/actor automatically stimulating in-group favouritism, whenever a group is formed. This point is in line with other researchers (e.g. Yamagishi, Jin & Miller, 1998).

Group perceptions begin when one member of the group perceives the situation in a certain way. The member then has the responsibility not only to communicate his or her perception of the situation, but also to persuade the other members that the perception is a good one (e.g. truthful, veridical, explanatory, workable). Consensus is here an indispensable element of social cognition. Some of the group members may be easily persuaded to that particular perception, having viewed the situation somewhat differently. It is in this process that *group perception* emerges. However, failures of collective perception may also occur during this process. Groups tend for example to develop in-group biases that may prevent them from perceiving the value of external sources of information. This may also be associated with different perceptions of task and situation. Hence, group knowledge structures can be as limiting and inappropriate as the individual knowledge. It is important that there is a continual process of perception within the group. Feedback between group members is here crucial to stimulate the collective operation towards a *collective consciousness*. If not, it may result in misconceptions leading to information needs that are hard to express and solve.

The *organizational approach* addresses the relation between situational influences and group behavior. Just as individual influences can affect how a group perceives problems and deals with them in a variety of ways, including information seeking, so also groups can be influenced by their larger situational and social context. The basic assumption underlying the organizational approach is that two groups with different internal structures will behave similar in the same situation. Groups often exist within the social structures and value structures of an organization that may result in similar group behaviors. Thus, the organizational approach is concerned with similarities of groups' perception of situations and how other groups influence one group's perception of the situation. There are many examples of groups whose collective activities are embedded in social contexts that constrain their behaviors. In an organization for example, network of work groups may find their understanding constrained by the context provided by the organization as a whole. Organizational factors constrain work groups' perception of a

problem situation as well as the actual choice or alternatives of action / behavior to solve the problem. When emphasizing organizational influences, the focus is on *common* value and knowledge structures of the organization whereas the focus on internal differences tends to be minimized.

Independent of the perspective or point of departure, that is, individual or group, personal and situational factors influences information behavior interactively. The characteristics of the influencing factors, however, change as the focus shifts from individual to group needs. Each type of need is addressed by Allen (1996; 1997) as a separate entity with its own inner or outer influencing factors, which can be explained by integrating the four, approaches in order to understand information needs and their accompanying information behavior.

In this context, the group member is considered an individual affected by inner cognitive influences (personal factors) but at the same time affected by the influences from other group members (social factors). This may be considered a 'social with-in-factor' from the perspective of the individual group member. At the same time, the individual as well as the group may be influenced by 'outer-factors', that is the work task situation or the organization (situational factors).

The *integrated* perspective or view on the *situated* individual has been applied to help explore and understand the individual '*group member-in-situation behavior'* over time. The four approaches are further described and discussed in the rest of the chapter.

2.2 Cognitive approaches

This section presents the cognitive viewpoint, underlying a substantial portion of theoretical and empirical work in information science, its dimensions and implications for research. As examples of cognitive approaches, Kuhlthau's ISP-model is presented and discussed in section 2.2.2 and Dervins Sense-Making Methodology is presented in section 2.2.3.

The focus of research associated with the cognitive viewpoint in information science is on how the individual user's model of the world mediates (or interact with) information behavior, primarily the interactive part of information seeking involving a mediator or an IR-system (Pettigrew, Fidel & Bruce, 2001). It refers to a set of constructs for

understanding information behavior, which focuses fundamentally upon general human attributes of the individual[8]. The cognitive viewpoint, thus, acknowledges research that examines the cognitive and emotional motivations for information behavior, which carry *across* contexts or are independent of context. This is distinguished from the social cognitive viewpoint (addressed in section 2.4), which focuses on attributes of the social and collaborative context in order to understand information behavior.

Since the first studies based on the cognitive viewpoint in the mid seventies, the cognitive approach in information science has developed in two periods. The first period covers 1977-1991, characterized briefly as user- and intermediary-oriented, whereas the second covers 1992-, representing a shift from an solely *individualistic view* towards a more *holistic view* on all the interactive communication processes that occur during information transfer (Ingwersen, 1999; Ingwersen & Järvelin, 2005). In this section, the focus is on the first period and the individualistic cognitive viewpoint underlying many theories and models as well as numerous studies in information science. The emerging holistic cognitive viewpoint is addressed in section 2.5.3 in connection with the concept of situation and context.

2.2.1 The individualistic cognitive viewpoint

Among many other disciplines[9], human cognition and cognitive processes involving communication and interaction has also been addressed by Information Science, primarily approached from a cognitive viewpoint - as one out of many epistemological and philosophical viewpoints[10].

The centre of the cognitive viewpoint is the concept of *knowledge structures*. Knowledge structures are the sets of concept relationships that comprise each

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[8] According to Hjørland (February, 2006), cognitive views in information science have mainly been based on abstracted, general human attributes that they try to model, belonging to the field of general psychology. This is in contrast to personality psychology, which focuses on individual differences or personality traits in information use

[9] Other disciplines focusing on cognitive processes are for example computer science, cognitive psychology, sociology, psycholinguistics and socio-linguistics (Ellis, 1992; Ingwersen & Järvelin, 2005).

[10] Other epistemological viewpoints that may serve relevant to the study of information behavior are, for example, pragmatism, rationalism and phenomenology (Ingwersen & Järvelin, 2005).

individual's model of the world. It is this model of the world that is seen to mediate an individual's information behavior, meaning that each individual will apply the knowledge structures that are required to perceive, interpret, modify or transfer information (Pettigrew, Fidel & Bruce, 2001). Coined by Mark De Mey for the first time in 1977, the central point of the cognitive view acknowledged by many researchers has been: "…that any processing of information, whether perceptual or symbolic, is mediated by a system of categories or concepts which, for the information processing device, are a model of his [its] world" (De Mey, 1977, p. xvi-xvii; 1980, p. 48). Applied to the processes of information behavior, the cognitive viewpoint aims at studying "…how an individual will apply his or her model of the world to the processes of needing, seeking, giving and using information." (Pettigrew, Fidel & Bruce, 2001, p. 47).

According to Ingwersen & Järvelin (2005), five central and interrelated dimensions of the cognitive viewpoint with relevance to information seeking and retrieval, can be identified:

1. *Information processing takes place in senders and recipients of messages.* According to this view represented in the first dimension, the actor - either human or machine -, may act as both sender and receiver of messages

2. *Processing takes place at different levels.*
   Information processing depends on whether the actor is a human or a machine and when (and how) we may speak of information opposed to signals, data and signs. De Mey (1977), for example, proposed a model consisting of four different stages of information processing: a monadic stage, a structural stage, a contextual stage and a cognitive or epistemic stage, which we also observe in linguistics (NLP) (Smeaton, 1992). Where stages 1-3 correspond to levels of language understanding, the fourth stage corresponds to the pragmatic level of perceiving and interpreting information. Hence, information becomes a construct derived from the actor's own world model in context and the perceived message of text. All four stages are open to human actors, but the less the context, the more freedom exists for interpretation. This 'semantic openness' leads Ingwersen and Järvelin (2005, p. 26) to stress the role of context to information processing, e.g. to disambiguate messages. The last three views belong primarily

to the holistic approach, which is further elaborated by Ingwersen & Järvelin in 2005 and addressed here in section 2.5.3.

3. *During communication of information, any actor is influenced by its past and present experiences (time) and its social, organizational and cultural environment.*
   According to this view, the individual 'cognitive model' or state of knowledge consists of knowledge structures defined to include emotional state that are based on individually interpreted situations and perceived social/collective experiences, education etc. As mentioned above, 'actor' refers, beside users, to authors, indexers, work task responsibles, managers, thesaurus designers etc.

4. *Individual actors influence the environment or domain.*
   Collective cognitive structures may be generated and modified over time. Such structures are the result of social interaction between individual actors entailing shared understanding of concepts as well as perceptions of work tasks, situation and relevance. The dynamic influence of individual and collective cognitive structures on work task situations and their further perception and cognition by the individual actors are all important factors for understanding information seeking and retrieval.

5. *Information is situational and contextual.*
   Due to the contextual nature of information, the time dimension and the influence from social interaction between individual actors, information as well as information seeking and retrieval becomes *situational*

To demonstrate the complexity of the 'world model concept', Ingwersen (1982) later extended De Mey's thesis. According to Ingwersen, the world model consists of cognitive structures that are determined by "the individual *and* social/collective experiences, education, training etc." (Ingwersen, 1982, p. 168). In this way, Ingwersen wanted to emphasize that the cognitive structures of an individual are not isolated from

or unaffected by the past and the social context[11]. The task of IR is to bring into accord the cognitive structures of the *various* actors in interactive information retrieval, e.g. authors, system designers and indexers with those of the user and/or the intermediary (human or computer) in order to cope with the specific information need in focus. He introduced the concept of *collective cognitive structures*, that is, the result of social interaction and subject domains as well as scientific and social paradigms. These may as well influence the structure of indexing systems and the relations of topics and concepts treated in the body of literature and in information needs. Despite this acknowledgement of the complexity of interactive IR involving various different cognitive structures, this was not reflected in research based on the cognitive viewpoint until the 1990s.
Most empirical studies in the first period concentrated on the nature of individual cognitive structures of users or humans, their interaction with IR-systems or the formation of information needs (Ingwersen, 1999). As a reaction against the dominating system driven approach, the goal was to obtain a better understanding of the characteristics of the interactive IR situation and the factors affecting actors, hereby improving the IR performance. Some central studies should be mentioned here.

Taylor (1968) developed a four-stage model, the Q1-Q4-model[12], of how the information need or problem may develop based on experiences from various reference situations in libraries. According to this model, the need of a human information seeker develops through four stages of which Q1-Q2 are internal to the human, representing a psychological state of mind, whereas the need at Q3-Q4 may be expressed either to another person or an information system, that is, a librarian or computer system, in line with Wilson (1981). The stages of need formation are named the 'visceral', the 'conscious', the 'formalized' and the 'compromised need'. The point in Taylor's model is that the need proposed to an information system is not the *real* need or problem.

[11] Ingwersen's understanding of the concept of 'world model' was influenced by the Russian cognitive psychologist Alexander Luria (1902-1977) and his work in the 1920s on humans' classification of objects. Luria found that educational background and work routines and situations influence the way humans categorize objects, either by categorical (generic and part-whole) or situational relationships.

[12] Q1-Q4 stands for Question 1- Question 4. Based on his experiences as reference librarian, the various stages of the information need is seen by Taylor (1968) as questions that may be either internal to the human or explicit to other humans or a system.

Influenced by the user's expectations to what the system may be able to deliver or understand he reformulate the need into a compromised need. In this case, the system should seek to work back to the underlying 'real' need in order to match the need with relevant information. This may be done through five filters, that is: 1. subject definition, 2. objective and motivation, 3. personal characteristics of inquirer, 4. relationship of inquirer [information seeker or actor] description to file organization and 5. anticipated or acceptable answers. In line with other studies from the first period, Taylor focused on the cognitive processes of need formulation, independent of the context and problem situation influencing that need. However, it can be argued that the second and fifth filter, specifically, seeks to take the intentional cause (work task, problem or goal) of information seeking behavior into account.

Focusing on information seekers' 'problematic situation' as a trigger to information seeking, Belkin, Oddy & Brooks (1982) originated the notion or hypothesis of 'the anomalous state of knowledge' (ASK) or 'information gab', which concerns the development of individual information needs. It was defined by Belkin, Oddy & Brooks (1982, p. 62) as the situation when "…an information need arises from a recognized anomaly in the user's state of knowledge concerning some topic or situation…" and further (Belkin, 2005, p. 44) that "…the user's state of knowledge…is in some way inadequate with respect to the person's ability to achieve some goal". The user is unable to specify what is needed, thus it may be more suitable for the user to describe that anomaly than his/her information need. The point in the ASK hypothesis is further that ASK may be solved through communication (interaction). Based on empirical investigations of information seekers problem statements, Belkin, Oddy & Brooks (1982) formulated two basic types of Anomalous State of knowledges (ASKs); the well defined and the more-or-less ill defined one.

Though having contributed to the development of information seeking and retrieval, the first period of the cognitive viewpoint has also been subject for criticism (e.g. Ellis, 1992; Hjørland, 1991; Ingwersen, 2001; Lueg, 2002).

According to Ingwersen (2001), the cognitive view can be critized in at least three areas, that is, for its lack of realism, theory integration and a holistic perspective taking into account the underlying context and problem situation. Too much emphasis has been put on the analysis of user and human intermediary behavior during interaction and many

studies have tended to ignore the cognitive structures also embedded into the system side and the contextual environment. In addition, investigations have often been made only with Boolean systems, making it difficult to generalize across system types. Hence, the individualistic cognitive viewpoint in Information Seeking and IR should be replaced by a *holistic* cognitive view, integrating both the human and the system side into research and development of interactive information systems. According to Ellis (1992), the cognitive viewpoint demonstrates two weaknesses as a research paradigm within information science. In the first place, no scientific achievements can be identified serving as exemplar for the cognitive approach or that may qualify as paradigm for that research, neither inside nor outside information sciences. In the second place, this approach holds an inherent complication by drawing upon the analogy between the human and system's cognitive worlds. The human processes (cognitive paradigm), for example, for perceiving, seeking, understanding and processing information are quite different from the processes and artefacts involved in computer based data processing (physical paradigm). Hence, the diverse focus in these paradigms has resulted in problems with the development of a powerful explanatory theory and science, taking *both* of these paradigms into account. According to Ellis (1992), this may also explain why progress in information retrieval research has tended to be fragmentary and limited, since research carried out within one paradigm only explores part of the problem. The criticism proposed by Hjørland (1991) addresses in particular three limitations and weaknesses for applying it to research in library and information science. The focus, for example, on users' cognitive and mental processes when developing information systems tends to ignore the real objective of information science, that is, to solve how content should be represented in the search system for retrieval. Further, cognitive theory may be good at describing and explaining simple mental processes, but not complex human processes involved in information seeking. This is to a certain extent in line with the analogy criticism proposed by Ellis (1992). According to Hjørland (1991) the cognitive theory has tended to over-generalize from specific type of experiments. In addition, it has been based on postulates rather than good examples. Hence, it has not been able to explain sufficiently the conceptual thinking of human beings as well as to be practical feasible in the development of IR-systems. Finally, he states that the fundamental weakness of the cognitive view is that it is based on individual mental processes. Human concepts do not arise individually but are formed in *social relations*, where people meet, collaborate and communicate. Focusing on individual knowledge structures as the core analysis level of information

science will lead to an impasse. Therefore he calls for an alternative to what may be called a 'methodological individualism' towards research in information science. The criticism by Lueg (2002) regards the limited and rationalistic perspective inherent in the cognitive view. Many information seeking models, for example, assumes that information seeking behavior is triggered by an information need resulting from a cognitive anomaly, while the underlying problem, which caused the need, is often ignored. He argues that the information need may not only be inside the information seeker's head, but generated in the interaction with the *situation*. Although the environment is often mentioned in information seeking research, the importance of the interaction with the environment as a generator of behavior is rarely addressed. Hence, work task and context as factors affecting the information need and behavior should also be taken into account.

In the next section, the work by Carol Kuhlthau will be presented and discussed in detail, that is, the development of the ISP-model and its contribution to research in information seeking behavior. According to Pettigrew, Fidel & Bruce (2001), Carol Kuhlthau's ISP-model represents a milestone in cognitive research by facilitating and stimulating research of information seeking behavior based on cognitive models of the information seeking *process*. In addition, with relevance to the present work, this model forms part of the underlying theoretical framework as well as constitutes the research object of the thesis.

2.2.2 Kuhlthau´s ISP-model

Motivated by an interest in investigating why students behave the way they do when seeking information, Kuhlthau (1991; 1993; 2004) has developed a model of the information seeking process[13] (ISP) that takes into account the information seeker´s[14] emotional, cognitive and physical experiences at different stages of the *process*. Kuhlthau (1991) wanted to address a recognized gap between information systems and

[13] Though Kuhlthau (1991; 1993) calls the process the "information search process", "information seeking" is used here to express the broader scope of the model and to distinguish it from the commonly more narrow use of the word, "user-system-interaction".

[14] Kuhlthau (1991) uses the term "user", but here we prefer the term "information seeker" to signify the broader scope of the ISP-model; often, 'user' refers to the " user-system-interaction" part of the process. When used in that sense, "user" is preferred.

users' natural process of information seeking in relation to construction and seeking meaning seeking. Traditionally, the bibliographic paradigm of library and information science has concentrated on collecting and classifying texts as well as devising search strategies for their retrieval. Consequently, the user's tasks, problems and processes in getting and using information had often been overlooked (Kuhlthau, 2004). The bibliographic paradigm is based on certainty and order whereas the process of information seeking and construction is motivated by problems that cause uncertainty and confusion. This can be noticed in the individual's behavior over time. The process of sense making, as described by Dervin (1983), involves the *whole* experience of a person, that is, feelings, thoughts and actions. When seeking information the person actively seeks meaning from information to solve a certain problem or subject while forming a personal point of view, which is critical.

By addressing the *concept of process* in relation to individuals' information seeking, the aim of Kuhlthau´s research has been to improve information system design and guide the encountering process made by intermediaries.

The ISP-model has been developed and further tested and verified in five studies (Kuhlthau, 1991; 1993; 2004), which include an initial study, two longitudinal studies and two large-scale studies. All studies have been carried out in academic settings[15]. The theoretical framework for investigating the information seeking process from the individual's perspective is based on theories from library and information science as well as constructivist theories of learning. This includes primarily John Dewey´s theory on acting and reflecting, George Kelly's Personal Construct Theory and Jerome Brunner's integrated perspective on learning and his theory of perception. Various qualitative and quantitative methods and tools have been used which also have contributed methodologically to the research and study of information seeking behavior in library and information science.

Each study is described in more detail below and summarized in Figure 2.6, modified after Kuhlthau (2004, p. 85).

[15] The ISP-model is based on studies focusing on students with a specific objective to be accomplished, e.g. accomplishing an assignment, and with a clear start and end

2.2.2.1 The initial study (1983)

The initial qualitative study addressed the problem of understanding the individual's experiences in the process of seeking information. Among many research questions, the primary question addressed was:
Do users have common experiences in the process of information seeking that can be articulated and described? Do users' experiences resemble the phases in the process of construction?

The study was conducted in a large, suburban high school exploring the experiences of Twenty-five academically capable high school seniors' when completing two assignments involving library research.
The methods and tools used to elicit the information seeker's perspective of the information seeking process were journals, search logs, short written statements, case ,study interviews, conceptual maps and perception questionnaires. In addition, the teacher's assessment of focus in the students' papers was collected.

The students kept journals during their progress in which they were asked to record their feelings as well as their thoughts and actions related to their library search. It could be thoughts about topics outside the library, as well as within. The students were allowed to include personal content and important aspects of their search with no restrictions on length or format. Some made descriptive entries, while others summarily recorded their actions or made only an occasional, incomplete entry. No control of recording were made, thus some recorded several entries at once, while others recorded their search on each day. Search logs were used to track the use of sources and their relevance during the search process.
Short written statements of the topic were made at two points in the process; two weeks after the assignments was made and two weeks after the submission of assignments. The descriptions proved effective for revealing change in focus formulation.
Case studies were used to collect data on students' experiences, perceptions and choices affecting the information search process. Six students were interviewed to clarify and explain the data collected in journals, search logs, writings and questionnaires. Conceptual maps in terms of flowcharts and timelines were used to collect and depict the mental models of the search process as experienced by the six participants. In addition to assigning a grade, the teachers were instructed to describe the focus of each assignment as vague, general or clear. The data were compared to students' information

competence. Finally, a perceptions questionnaire was used to examine the students' perception of six areas of library use which were: General library use, topic selection, research assignments, focus formulation, procedures for gathering information and the role of mediators. The answers were given using a 5-point Likert scale from 'almost never' (1) to 'almost always' (5).

Data were analyzed to reveal stages of the ISP and the accompanying actions, thoughts and feelings at the beginning, the middle and the end of the search process. The objective of the data analysis was to find evidence for the theoretical assumption that students' experiences in the search process would match those in the phases of construction and further, document similar associated feelings. According to the theory of construction, the affective experience of the individual is likely to have a profound effect on the process of construction.

Based on the analysis of the data from the initial study a model of the information seeking process (ISP) emerged.

As shown in Figure 2.6, the ISP can be divided into six stages[16], which differentiate between information searched, ways of searching for information and relevance assessments, while moving the seeker from the initial state of a recognized information need to the goal state of resolution. This movement is caused by a series of choices regarding topic selection and focus formulation made through a complex interplay between three realms of activity: physical (the actions taken), cognitive (thoughts about the process and content) and affective (feelings experienced) (Kuhlthau, 2004).

[16] Kuhlthau refers to the six stages directly related to the information search process. The last column in the model 'starting writing' is only relevant to depict the stage *after* end of searching

Stages	**Task Initiation**	**Topic Selection**	**Prefocus Exploration**	**Focus Formulation**	**Information Collection**	**Search closure**	**Starting writing**
Feelings (affective)	Uncertainty	Optimism	Confusion/ frustration/doubt	Clarity	Sense of direction/ confidence	Relief	Satisfaction or dissatisfaction
Thoughts (cognitive)	Ambiguity ⋯⋯▶ specificity ⋯⋯▶ increased interest						
Actions (physical)	Seeking relevant information ⋯⋯▶ Seeking pertinent information						

FIG. 2.6. The initial model of the Information Search Process.

(Kuhlthau, 2004, p. 45)

According to Kuhlthau (1991; 1993; 2004) the six stages and their accompanying tasks[17] are:

1. Task initiation – recognise information need
2. Topic selection – identify general topic
3. Prefocus exploration – investigate information on general topic
4. Focus formulation – formulate focus
5. Information collection – gather information pertaining to focus
6. Search closure – complete search

The last stage in the model though not further taken into account by the model is:

7. Starting writing - presentation

The relationships between the six stages of the ISP-model as well as the interrelationships between the affective and cognitive experiences and physical actions are further explicated in the model.

[17] 'Task' refers here both to 'learning tasks' and to the processes associated with 'problem-solving' and 'information seeking'.

The ISP-model shows the information seeker's constructive (learning) tasks and activities of finding meaning from information to extend his/her state of knowledge on a particular problem or topic. According to Kuhlthau (1991), the information seeking process is initiated by uncertainty resulting from a lack of understanding, a gap in meaning or a limited construction to solve a certain problem. This will change over time concurrently with the seeker getting information and constructing meaning to solve the problem. During the initial stages of the information seeking process the information seeker is commonly feeling confused, frustrated and in doubt; in the final stages he or she is commonly satisfied, confident and relieved (Kuhlthau, 1991, p. 366). 'Focus formulation' represents the *turning point* of the ISP where feelings of uncertainty diminish and confidence increases. The task here is to form a focus from the information encountered. At this point and throughout the rest of the process, information seeking typically starts to decrease whereas writing starts to increase, also signifying that the information seeker has started entering the 'start writing' or 'presentation' stage (Kuhlthau, 1991, p. 368). At the 'search closure' stage, the task is to complete the search and prepare to present or otherwise use the information from the 'information collection' stage'. Searching activities at this stage focus on rechecking, though many personal reasons for closing may also be applied. Feelings of relief are common with a sense of satisfaction if the search has gone well or disappointment if it has not. Further, as the knowledge state shifts to clearer, more focused thoughts about the topic or problem, a corresponding shift is typically noted in feelings of increased confidence and certainty. The last stage 'start writing' is not further taken into account as part of the ISP-model, except as a manifestation of the end of searching.

To further test the ISP-model and the perceptions of the information seeking process formed by previous experiences, two longitudinal studies were conducted. As pointed out by Kuhlthau (2004, p. 71) "longitudinal studies are essential for revealing the constructs that individuals built over time". The first longitudinal study was primarily based on quantitative data whereas the second was based primarily on qualitative data.

2.2.2.2 Test of the model (1986)

The second study of the ISP aimed at further verifying the model by addressing the relationship between introduction to the ISP-model, library experience and the

individual's perceptions[18] of the information seeking process. More specifically, the research question was: How had students' perceptions of the information seeking process changed after four years of college?

Except for five students, the same twenty-five students from the initial study participated in this study. The study aimed at assessing the students' perceptions of the information search process and how these compared to the six stages of the ISP-model at the beginning of their senior year in high school and again after four years of college. To enable a comparison and analysis of change in the students' perceptions over time, the same questionnaire was answered in high school and again after four years in college. In the last case, the questionnaire was also followed by three questions and an invitation to make comments. Between the two events, the ISP-model was presented to the students. A t-test was used to determine any significant difference between the students' responses in high school and in college.

The study showed that the model held over time with regard to this group of students. However, their perceptions changed during four years in college in three out of six areas: research assignments, focus formulation and procedures for gathering information. Interest in topic increased as the search progressed, topic changed as information was gathered and using the card catalogue as the only place to initiate a search decreased whereas the use of periodicals increased. This may indicate that shift in context, in this case from high school to college, affects perceptions. The expectation of deepening interest provided the motivation for pushing on through the confusing, frustrating, prefocus stage. Further, the students came to perceive library use as related to course work rather than an extraneous requirement. Regarding focus formulation, they came to expect a central theme to evolve during a search for information. No significant change in their perceptions regarding general library use, topic selection and the role of mediators were found. The students still perceived a minimal role of formal mediators such as librarians and teachers. They disclosed, however, that they talked to *others* about their topic.

To get a fuller description and understanding of changes in participants' perceptions of the ISP over time, a longitudinal *case study* was conducted.

[18] Kuhlthau (2004, p. 75) uses 'perceptions' synonymous with 'constructs', which means perceptions as the result of a process of construction.

2.2.2.3 Test and adjustment of the model (1987)

The third study of the ISP concentrated on changes of the information search process as perceived by students after four years of college. The research question was: What do longitudinal case studies reveal of students' internal view of the ISP after four years of undergraduate study? Four of the six original case study subjects participated in a one-hour interview session. The data were then analyzed according to the following five categories: research assignments, topic selection, search process, procedures for gathering information and the role of mediators.

Participants preferred research assignments to e.g. exams as a constructive way of learning. Based on past experience on doing research they now tolerated a period of uncertainty and ambiguity in the formative stages as a natural part of the research process.

Habitual approaches were found to affect topic selection, which were consistent over time: personal interest, assignment requirements, the information available and the time allotted. Personal interest however, tended to have the biggest influence on the choices made.

The participants' descriptions of the search process revealed a *spiral* of thoughts building from the information encountered rather than a neat step-by-step progression. In addition, the concept of what is enough and the question on when to stop a search (closure) was perceived very differently. This means that the perception of closure was determined by the person himself or herself rather than by characteristics of this specific group of students.

Though the students in the two longitudinal studies recognized the stages in the original model if the ISP, the analysis of the data also indicated a need for revision and modification of the model.

The assignment imposed an information need, which raised an *additional* personal need for internal meaning making at the 'initial stage', also requiring additional reflection on questions and problems. Personal interest as criteria at the 'selection stage' became a more important criteria as the participants moved towards an area of specialization. The exploration stage also revealed a more disorderly process and information seeking behavior. Often, the students used sources already at hand, known or recommended before less accessible sources were chosen. The 'formulation stage' was described to

occur toward the middle or latter part of the process, that is, after they had been searching for some time. In the original model, the three stages from exploration to collection are depicted as separate stages, but the longitudinal study revealed that these stages rather are overlapping and merging. Hence, the information seeking process should not be understood as a strictly line, but rather as an iterative process towards a clearer and more focused perspective. Further, it was found that decisions of relevance change with increased personal knowledge and understanding. At the 'collection stage', students revealed personal systems for collecting information, not commonly recognized as part of the library instructions programmes. Completion of a search was determined by either having exhausting sources or enough to present. But again, personal standards were consistently used to determine closure. At the 'presentation stage' outlining and 'giving to others' was found to help structuring the information for writing.

The result from the two longitudinal studies resulted in a revision and modification of the ISP-model, which is shown in Figure 2.7. The most significant change is the replacement of the stages 'search closure' and 'starting writing' with the 'presentation' stage and the revised cognitive process of focus formulation.

Tasks	**Initiation**	**Selection**	**Exploration**	**Formulation**	**Collection**	**Presentation**
Feelings (affective)	Uncertainty	Optimism	Confusion/ frustration/doubt	Clarity	Sense of direction/ confidence	Satisfaction or disappointment
Thoughts (cognitive)	vague ..... ▶ focused ..... ▶ increased interest					
Actions (physical)	seeking relevant information , exploring ..... ▶ seeking pertinent information, documenting					

FIG. 2.7. The [final] model of the Information Search Process.

(Kuhlthau, 2004, p. 82)

Based on the test of the ISP-model in two small-scale longitudinal studies, the model has been further tested in two large-scale verification studies (Kuhlthau, 2004, p. 53). Both studies have been designed to collect data on actions, thoughts, and feelings of library users in the process of an extended search for information. Quantitative analysis has been applied in both cases.

2.2.2.4 Verification of the model (1988)

The fourth study of the ISP aimed at investigating whether difference in grade would affect individuals' perception of the ISP-process. The research question was: Do low- and middle-level high school seniors and other high-achieving seniors experience the information search process as described in the model? 147 students from six high schools, representing a diverse population regarding achievements, participated. During a four weeks period, each participant was assigned an English paper requiring library research. While preparing the assignments, instructional sessions on the search process were given by librarians. Process surveys were used in combination with teacher assessments of focus in the students' papers. The process survey was intended to collect data from a large sample that could be analyzed and compared. The objective was to elicit experience in terms of actions, thoughts and feelings at the beginning, middle and end of the search process. Teachers' assessments of focus were made on a scale from 1 (low) to 10 (high), and in addition to the listing of number and variety of sources cited in the bibliography. The grades given by teachers were also collected. Various statistical techniques were used to analysis the data. The data from the low-level students were incomplete and consequently left out of the analysis. The results showed that the underlying concept of the information search process was verified in the study, demonstrating how information seeking is a complex learning process that involves finding meaning. Thoughts evolved, feelings changed while confidence increased as the search progressed. A slight correlation was also found between increase in confidence and teachers' assessments of the product. The outcome of the search process was learning. However, the number of sources did not correlate with teachers' assessments. According to Kuhlthau (2004, p. 58) this may indicate that the quality of the process has more impact on learning than the quantity of sources.

2.2.2.5 Verification of the model (1989)

The fifth and last study of the ISP aimed at verifying the model with a diversity of library users. The research question was: Does the model of the information search process hold for a large, diverse sample of library users? Thirtyeight participants were selected from school, public and academic libraries. Except for the public library users, all participants were students. The study was conducted in field situations. Three techniques were used to collect data – a process survey, a conceptual map and a perceptions questionnaire, all of them adapted from the instruments used in the prior studies. The process survey was changed to test the model with more detail and

precision. Nine questions were posed. The first four questions were open ended, e.g. to ellicit cognitive aspects of the search process shown in thoughts of topic; the rest of the questions were related directly to the ISP-model. The survey was given to the participants at three points in the process – at initiation, midpoint and closure. Conceptual maps were used to see how the participants perceived the search process over time, depicted as flowcharts. Finally, the participants' perceptions of the search process and the role of mediators were tested in a Likert-scaled questionnaire consisting of twenty questions. The questionnaire was filled out before and after the search process. Various quantitative techniques were used to analyse the process survey and the questionnaire data.

Findings revealed a similar process across types of library users. The findings indicated that participants' thoughts about their topic became clearer and more focused as they moved through the search process, seeking more focused and pertinent information towards the end of the search process. Feelings accompanying the changes in thoughts also matched those predicted in the model with confidence increasing towards the end of search. Uncertainty, confusion and frustration on the other hand decreased during the process as feelings of being satisfied, sure and relieved increased. The study revealed also an important new finding (Kuhlthau, 2004, p. 67). Though thoughts and feelings matched the model anticipated, the participants' identification of the [search] task[19] did not. The ISP-model shows a progression from recognizing an information need to identifying, exploring, gathering information on topic and to completing the search process. The participants, however, perceived the search task process primarily to gather information.

Although there were a strong evidence of clearer thinking about a topic as the participants moved through the information seeking process, half of the participants did not make focused statements at closure. According to Kulthau (2004, p.68), this may lead to the assumption that many people may enter the presentation or writing stage without a clearly focused topic. To some people, however, organizing and writing may help them focus their thoughts. Consequently, focus formulation may appear at a later point in the process than the model indicates. As slightly touched upon by Kuhlthau (2004, p. 68), the nature of the work task may also affect the process of construction and

[19] Though not explicated by Kuhlthau (2004), 'task' refers here to the search task – not the work task

the focus formulation accordingly. It may also indicate that other factors besides searching information affect the process of construction and the seeker´s emotional and cognitive experiences. Regarding the initial study, strategies such as talking/discussing, writing and thinking to seek information or work through a stage of process seemed to be as important to students' process of construction as the actual sources and formal strategies that they used. Informal mediators such as family or friends were often involved in this way in contrast to formal mediators such as librarians and teachers. In addition, the last study showed that experts were preferred to librarians with no significant difference by type of library.

The five studies and their characteristics have been summarized in Table 2.1.

Study	**Research questions**	**Methodology**	**Key findings**	**Implications**
1.Initial (1983)	Do users´ experiences in the ISP resemble the phases in the process of construction in a 6-stage; can they be articulated and described	Small-scale qualitative study of high school seniors (25 participants); base for grounded theory. Methods: Journals, search logs, short written statements, case study interviews and conceptual maps, teacher's assessment of focus and perceptions questionnaire	Common patterns in ISP correspond to process of construction in a 6-stage model	The initial ISP-model as being experienced by the user in six stages of thoughts, feelings and actions
2.Testing (1986)	How had students perceptions of the ISP changed after four years of college	Longitudinal quantitative follow-up study with participants from study 1 (20 participants). Methods: Peceptions question-naire (+ T-test)	Perceptions of the ISP became more like the model over time, particularly regarding focus and process	The model held over time for this selection of students
3.Testing (1987)	What do longitudinal case studies reveal of students' initial view of the ISP after four years of undergraduate study	Longitudinal qualitative case study (4 participants). Methods: Interviews, conceptual maps	ISP described as a purposeful, sense making process	Based on the two longitudinal studies, refinements and adjustments to the ISP-model were made
4.Verification (1988)	Do low-and middle-level high school seniors and other high achieving seniors experience the ISP as described in the model	Quantitative study with six high schools (147 participants with different grades). Methods: Process surveys, teachers' focus-assessments and grades	The model was confirmed in a larger, more diverse sample of high school seniors. In addition, there was an indication of a correlation between focus in research papers and change in confidence during search process	Process quality has more impact on learning than number of information sources
5.Verification (1989)	Does the model of the ISP hold for a large, diverse sample of library users	Large-scale verification at twenty-one sites (385 participants). Methods: Field study, process survey, conceptual maps, perceptions questionnaire	The model was verified with academic, public and school library users. While thoughts and feelings matched the model anticipated, the identification of task did not	The model held for the library users in academic and public libraries as well as with a range of high school students

TABLE 2.1. Five studies of the Information Search Process (ISP) in educational settings:

Research questions, methodology, key findings and implications

In recent years (Kuhlthau, 2004), the ISP-model has also been tested in *workplace settings*; first in a longitudinal case study of a securities analyst and next in an exploratory study of lawyers. Both work contexts were information-intensive. The aim was to understand the information worker's perception of the information search process, particularly regarding uncertainty, complexity of tasks, construction of knowledge as well as to investigate what difference expertise makes to the information search process. The two studies are described in detail below and summarized in Table 2.2.

2.2.2.6 Securities analyst (1990 & 1995).

An in-depth longitudinal case study of one securities analyst was conducted to investigate further how *experience* would relate to the information seeking process (Kuhlthau, 1999). For example, would perceptions of the information seeking process of an early career worker change as he became an expert[20], that is, more experienced and proficient of his work[21]?

The study addressed the concept of *uncertainty* in relation to *task complexity* and how it may change according to experience. Also the role of the mediator in the process was addressed. The longitudinal study initiated in 1983, when the participant was in secondary school. The participant had previously revealed an understanding of the information seeking process and was identified as a competent information worker. Two in-depth semi-structured interviews were conducted in 1990 and again in 1995. After the second interview, the participant was asked to read the transcript from the first interview and comment on any changes in his patterns of information seeking.

The findings showed that perceptions of the information seeking process *change* as the information worker get more experienced. As a novice, it is important to be 'right. As an expert it is more important to add value to the client's knowledge base. Perception of task complexity also differed according to the level of expertise. As a novice, more tasks were considered complex than as an expert. Hence, the perception of task complexity rather than the actual, objective complexity itself, also seemed to be a

[20] Expert is associated with the work domain and defined by the participant's number of years of experience in the field and recognition of expertise by an independent (Kuhlthau, 2004, p.168)

[21] Work is associated with tasks that require information and construction over time to be accomplished

critical factor to the experience of uncertainty. As a novice the securities analyst felt anxious at the end of a project, which was associated with how his analysis would be received and if his conclusions were right. Further, he was anxious of not having enough information and of not having the right information. As an expert he felt uncertain less often, but simultaneously, his tolerance towards uncertainty-related tasks decreased, probably due to the pressure of greater responsibility.

Information sources also turned out to play different roles according to the novice or expert level. The more experienced the information worker, the more interactive he was with his information sources, especially in the use of external sources. Clients, for example, became more important sources as experience were gained.

The study of the securities analyst also showed that the ISP-model tended to be more applicable in association with the process of construction, that is, the complex tasks than in routine work tasks.
To further study how experienced information workers would seek and use information to accomplish complex tasks, a group of early career lawyers were chosen for the next and exploratory study by Kuhlthau & Tama (2001) of the ISP in work task settings.

2.2.2.7 Lawyers [2000][22]

The exploratory study of early career lawyers addressed the following research questions: Does this group of early career expert information workers differentiate between routine and complex tasks? Are tasks that are identified as complex related to the construction of new knowledge? Does this group of experts experience the information search process as depicted in the model in more complex work tasks? Is uncertainty related to more complex tasks? What are the roles of mediators in the process of information seeking and use of this group?
Eight lawyers identified as early career workers with six to ten years of experience participated in the study. Their primary task was to serve clients with information as well as using information in preparation for cases for trial.

[22] Kuhlthau & Tama (2001) do not mention when the study of lawyers was conducted.

Semi-structured one-hour interviews were conducted with each lawyer individually. The interview focused on the lawyer's perception of the information seeking process at the beginning, midpoint and end while preparing for a case.

The analysis of the interview data showed a difference between routine and complex tasks. Complex tasks were accomplished in stages, moving from fact gathering to theory building to resolving the case through trial. This process required considerable thinking and formulation, e.g. of a new strategy or new approaches to provide evidence in a case. The lawyers experienced a sense of uncertainty related to the process of constructing knowledge for a case and a feeling of confidence at the end, in correspondence with the ISP-model. However, none of the lawyers responded to uncertainty with anxiety and frustration like the participants in the previous studies. Based on past experience they had learned to accept uncertainty as a natural part of complex cases requiring knowledge construction. Hence, uncertainty had become a natural part of starting out with a new case in line with creativity, interest and enthusiasm. The information seeking behavior differed across their preparation for a trial. In the beginning they were looking for background information. At midpoint various sources were used, such as legal reference sources, internal office files, external electronic resources and people, internally as well as externally. The construction process stopped when the preparation for presenting the case in court started. At that time, the laywers felt they had used enough information sources to complete the task of formulating the critical arguments.

Compared to the ISP-model, the lawyers' movement from initiation to completion of information-seeking tasks followed the sequence of stages in the ISP-model. The use of mediators was limited, though all lawyers used some type of assistance in information seeking and use to accomplish their work.

To sum up on the two work task studies it was found that the stages of the ISP-model were associated with complex tasks rather than with routine tasks. Though both groups of participants experienced uncertainty in relation to complex task, their reactions and perceptions of complexity differed according to their level of experience and perception of time. When no time pressure was perceived, for example, the initial uncertainty was welcomed as a natural part of the constructive and creative process associated with the work task.

Study	Research questions	Methodology	Key findings	Implications
1. Securities analyst (1990) & (1995)	How is experience related to the information search process How does this affect the worker's perception of uncertainty, task complexity, construction of knowledge and the information search process	Longitudinal case study 1990: in-depth interview 1995: in-depth interview transcript from the first interview	Perceptions of uncertainty and task complexity differ between novice and expert level. A relationship exists between task complexity and stages of the information search process	Further studies are needed to validate the relation between complex tasks and the ISP-model
2. Lawyers [2000]	Does this group of early career expert information workers differentiate between routine and complex tasks? Are tasks that are identified as complex related to the construction of new knowledge? Does this group of experts experience the information search process as depicted in the model in more complex work tasks? Is uncertainty related to more complex tasks? What are the roles of mediators in the process of information seeking and use of this group?	Exploratory study Semi-structured interviews with 8 participants	The stages of the ISP-model hold for the complex work task of preparing for a case. Uncertainty was acknowledged as a natural part of the initiation of a case, but associated with the perceived time for the task. Various information sources were used I preparation of a case, which differed according to stage in the process of construction The mediator role of the librarian was limited	Further studies of information workers solving complex work tasks are needed. In addition, the role of the mediator should be further investigated to provide for guidance during zone of intervention

TABLE 2.2. Two studies of the Information Search Process (ISP) in work place settings

2.2.2.8 Summary of the ISP-model

Since the development of the ISP-model in 1983, the model has been tested, verified and adjusted to encompass the information seeking behavior associated with the process of construction. Building upon a grounded theory approach (Kuhlthau, 2004), concepts and themes have emerged that have been further explored through longitudinal studies in various educational settings as well as in two work task settings. Both qualitative and quantitative methods and techniques have been applied.

In general, the feelings associated with each stage of he ISP held for the participants in each of the seven studies. In the beginning of the process the individuals were normally feeling uncertain and frustrated, but along the construction spiral of information seeking and meaning making, the level of confidence increased while the level of uncertainty decreased. A correlation between the affective and the cognitive experiences of the model was identified. However, what the physical activities of the model is concerned,

no strong correlation was found between the information seeking activities at each stage and the cognitive and affective experiences.

In addition, it was found that the stages in the ISP-model also fit the stages perceived by individuals accomplishing *complex work tasks* involving the process of constructing new knowledge. The individual's perception[23] of complexity in relation to the problem situation or the task was here critical. This was also found to be affected by the person's level of domain experience (work task knowledge). The experienced person, for example, was more willing to accept feelings of uncertainty in the beginning of a project as a natural part of the construction process than the novice person. Acceptance of uncertainty also resulted in a more invitational approach to information seeking. Based on these studies, Kuhlthau (2004) has recently developed a 'theory of uncertainty' and a 'theory of zone of intervention'[24], implying here also the role of the mediator in the construction process.

2.2.2.9 Discussion of the ISP-model

Since the development in 1983, the ISP-model has stimulated and formed the underlying framework of many, also recent, studies of information seeking behavior, primarily in academic settings (e.g. Byron & Young, 2000; Heinström, 2002; Holliday & Li, 2004; Kracker, 2002; Kracker & Wang, 2002; Limberg, 1998; Vakkari, 2001). The model, however, has also been employed in a few workplace settings (e.g. Attfield & Dowell, 2003; Cheuk Wai-yi, 1998) and practices of everyday life (e.g. Warner & Procaccino, 2004). These studies in conjunction with other studies of relevance to the present study will be taken into account along with the discussion of the ISP-model below.

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[23] Kuhlthau's use of *perception* corresponds to constructs or meaning

[24] 'Zone of intervention' refers to that area in which an information seeker can do with advice and assistance what he or she cannot do alone or can do only with great difficulty in order to accomplish his/her task (Kuhlthau, 2004).

Kuhlthau's research and ISP-model represents a milestone in cognitive research (Pettigrew, Fidel & Bruce, 2001). However, being a product of the *first* cognitive period, resting on an individualistic view (Ingwersen, 2001), the ISP-model also has many characteristics in common with studies and models of information seeking behavior derived from that period.

In line with the cognitive approach, the ISP-model may be regarded as a metaphor for *common* experience in the information seeking process. The focus is on the individual seeker's behavior and knowledge construction during time, while the specific context and situations framing this process play a minor role. Hence, it may be argued that the model rests on the assumption that the individual problem solver's process of knowledge construction and affective experiences are associated (almost) *solely* with information seeking activities at various stages of the ISP.
The influence from other factors have however been introduced by Kuhlthau in the discussions of the results of the seven studies presented here. For example, personal factors were identified as part of the initial processes of topic formulation and in relation to the mediator function, and domain and search experience were found to affect individuals' perception of the ISP. Work task factors were mentioned in association with topic selection, where time and assignment requirements were found to affect choise of topic; and in connection with search closure, when 'time limits' or 'having enough to present' were used as explanation by participants for search closure as opposed to 'having exhausting sources' that rather related to cognitive factors. Work task activities, meaning writing, has also been mentioned as an important element that might support the process of construction, but only referred to as part of the topic selection stage in terms of 'note taking'. Otherwise, writing has been described at an abstract level as part of the presentation stage and *after* end of search[25]. According to Mason (1998), the act of writing may also play a significant role in the individual's process of knowledge construction or for generating a personal involvement (Rivard,

[25] The reason for placing 'writing' as part of the presentation stage *after*- and not concurrently with the seeking activities may be rooted in history and explained by the technological conditions for writing at that time. Typewriters were still a common phenomenon in the beginning of the 1980s, whereas text-editing allowing for a more iterative writing process from the beginning of the research process first later replaced this form of writing.

1994). The importance of social factors, such as 'discussing the assignment with others or informal mediators', have also been acknowledged, but primarily as part of the initiation and topic selection stage.
However, when considering the findings by Kuhlthau regarding the weak correlation between the information seeking activities at each stage and the cognitive and affective experiences, it may be argued then that *other* factors intermingle with the complex process of knowledge construction and meaning making, which the studies below also seem to suggest.

This weak correlation was also found in a study by Kracker (2002) and Kracker & Wang (2002) of the 'research' model implied in the ISP-model, leading to the identification of work task factors affecting the behavior of students assigning a research paper. More specifically, an experimental study was conducted addressing the 'research model' implied in the ISP-model and the importance of students' awareness of this research (the work task). The participants were 90 undergraduate students assigning a research paper during fall 1999. Based on a 30 min. introduction to Kuhlthau's ISP-model, the researchers wanted to investigate whether this would improve the awareness of the thoughts and feelings associated with the research process, reduce students' perceived anxiety levels and enhance their ability to learn accordingly[26]. In contrast to the ISP-model, both seeking and writing were included as part of the research process. One group of students got a guest lecture about technical writing instead that served as control. Both qualitative and quantitative methods were applied. Kracker & Wang (2002) reports the qualitative part, whereas Kracker (2002) reports the quantitative part. Regarding the qualitative part of the study, subjects were asked to recall a specific research assignment and describe their associated feelings and thoughts from start till end. After the introduction to the ISP-model, subjects were asked to describe the current research project and record their associated feelings and thoughts from start till end. The quantitative part measured students' perceptions about research using a questionnaire with a five-point Likert scale and students´ anxiety levels using a standard state anxiety test (STAI Y-1). The strategy was the same, meaning that students were pre- ad post-tested in relation to a previous and a present assignment.

[26] The study did not address the outcome, that is, whether the introduction to Kuhlthau's ISP-model, for example, would result in better papers.

The results demonstrated that the feelings described in the ISP-model held for this study as well and that educational intervention can significantly reduce anxiety. However, anxiety was not only associated with 'library anxiety'. Feelings associated with the research process were also identified, for example, related to the start of research, collection of information, writing and in relation to overall aspects, such as time management. Anxiety resulting from writing is in line with Fister (1992). According to this study, writing may take place at many stages during the research process and, hence, cannot be separated from searching. Though many of the participants had difficulties in finding a focus, positive feelings of 'relief' were identified in the end with the completion of the *assignment.* Besides 'anxiety' and 'relief', feelings such as 'difficult', 'confidence' and 'interest' (motivation) were also identified in the study. These emotional experiences were divided into three meta-groups: 'feelings about process', 'perceptions of the task' and 'affinity to research'. Following from this it was concluded that research anxiety is more than library anxiety. According to Kracker (2002, p. 284) uncertainty and anxiety lies within the process itself, not within the individual. The emotional impact from the work task (the research assignment) is in line with Onwuegbuzie (1997). In a study of 81 graduate students, he investigated how various forms of anxiety and uncertainty were related to the research process. The results showed that anxiety correlated with aspects of the work task, but also that anxiety could be related to personality. It was then concluded, among others, that research proposal writing anxiety (RPW-anxiety) seems to be a *multidimensional* construct.

The dynamics between context and the concept of uncertainty as employed in the ISP-model has further been addressed in two recent studies of journalists' and women's' information seeking behavior.

Based on a survey instrument following the assumptions in the ISP-model, Warner & Procaccino (2004) asked 199 women to assess the process of seeking health information. Results associated with the uncertainty stage of the ISP-model showed a *high* use of family and friends as a health seeking method in line with findings by Kuhlthau (1991; 2004). In Kuhlthau's studies personal sources were primarily used in the initial stages of the information seeking process (ISP) when selecting and exploring a topic. It was concluded that the *human personal mediator* might be chosen over the electronic one regarding the mediation of health information to reduce the perception of

uncertainty. This is in line with Wilson (1981; 1999) stating that persons may serve both as information sources *and* mediators throughout the *whole* problem solving process, and not only in the beginning.

The interview study by Attfield & Dowell (2003) investigated the information seeking behavior and use of 25 journalists at a national British newspaper, which was based on the ISP-model, among others. It was found that journalistic work is uncertain and evolving, resulting from an uncertain context. This implies, for example, unstable relevance judgements as well as re-initiating activities in later stages. According to this, a 'new' dimension of uncertainty was identified due to the dynamic context of journalistic work. This was the uncertainty that occurs as a result of product constraint changes, e.g. the task changing itself. Hence, uncertainty was here more directly associated with the work task or the context, rather than a 'vague formulation of topic' or a 'perceived gab of information' as implied by the ISP-model.

Vakkari (2001)[27] has also explored the role of the work task in information seeking in a longitudinal study of 11 master students preparing a research proposal for a master's thesis. The aim of the study was to investigate how the stages of task performance, that is, the students' problem stages in writing a research proposal were related to the information search behavior described in the ISP-model. Search behavior was defined as the information types searched for, choice of search strategies and the relevance judgements made. Based on a qualitative study approach, various methods were applied such as think-aloud-search sessions, search log, diaries an interviews at three selected points in the research process. The results of the study demonstrated that the stages of the ISP-model, and thus, the increasing differentiation of the students' cognitive structures had a *systematic* impact on their search behavior in the task performance process. Hence, the findings were supported by the ISP-model and findings from cognitive psychology. The study lead to a theory of the information search process in task performance, though only tentative due to the small number of participants, which further could be seen as an *expansion* of the ideas in Kuhlthau's model with regard to IR. What task based information searching is concerned, Vakkari (2003) distinguishes

[27] Vakkari (2001) reports a study that has been further described in four articles (Vakkari, 2000a; 2000b; Vakkari & Hakala, 2000; Vakkari & Pennanen, 2000)

between task as a *process* consisting of several stages and task as an *a priori* condition, left without any further characterization. In both cases, the point of departure is often searching, not the work task that has produced it. In this context, the ISP-model can be seen as an example of the first type, though the focus is on the individual´s information seeking process of meaning construction. Though the ISP-model containing work task elements, may also be seen as a work task model (Byström & Hansen, 2005; Vakkari, 2003), the underlying problem stays in the background as an a priori condition; 'task' is primarily conceptualised and addressed in terms of search tasks and associated subtasks, that is, the searching activities and processes involved at various stages – not in terms of the work task itself. As already mentioned, Kuhlthau (2004, p. 42) acknowledges that task related criteria, such as formal requirements and time, may play a role when selecting a topic or formulating a focus. Further, they may influence information seekers' expectations, predictions and choices in information seeking as well.

The impact from the work task on the information seeking process has also been explored by Byström & Järvelin (1995). In line with the two work place studies by Kuhlthau (1999; 2001), they found that the *perceived* complexity of the work task affected the information seeking behavior accordingly. This issue and the conceptualization of task based information behavior will be further addressed in chapter 3, concerning the 'work task' factor.

Contextual factors associated with information seeking based on the ISP-model have also been identified in studies on learning and information literacy.

In her dissertation from 1998, Limberg (1998) reported on the results from an explorative investigation of the interaction between information seeking and use and the learning outcome. The ISP-model formed the basis of the empirical study on how 25 high school seniors seek and use information to learn about the subject content of an assignment. The students worked cooperatively in five groups during a four months period. Several methods were implied such as interviews, observation, written reports and the teacher's assessment to every final paper. It was concluded that students' conception of information seeking and use interact closely with their conceptions of the content of information. This contradicted the established view on information seeking as a general process regardless of content. Limberg (1998) proposed that her findings might be seen as an elaboration of 'topic selection' in Kuhlthau's model with the

emphasis on focus formulation, as Kuhlthau has not investigated the character of the interaction between topic content and information seeking. Limberg's study is further addressed in chapter 4, concerning group work in academic settings.

Based on the study approach from Kuhlthau's fifth study in 1989, Byron & Young (2000) investigated the applicability of the ISP-model in the context of a virtual learning environment. Eighty-one undergraduate and graduate students had agreed to use virtual collaborative activities in relation to an assigned academic task. The participants were required to work in groups and find and use material beyond those provided by an instructor. A demographic survey was handed out in the beginning, and a process survey, almost similar to the survey used by Kuhlthau in her 1989-study, was handed out at three points in the process: start, midpoint and end. The results showed that the students followed the stages in the ISP-model and that these stages seemed to be independent of the physical library, meaning that they hold for the virtual learning environment as well. Though participants exhibited the stages anticipated by the ISP-model, the social element associated with group work and the fact that all the participants were group members, became an unexpected factor. Hence, it was suggested that the implications of group work to the ISP-model should be further explored.

An in-depth case study was conducted by Cheuk Wai-Yi (1998) that addressed information literacy in relation to knowledge workers. More specifically the aim of the study was to investigate what kind of process people goes through in the workplace in order to seek and use information effectively. The focus was on the constructive process of how to seek and use information according to perceived situations. Kuhlthau's ISP-model formed the basis of the study that followed 8 knowledge workers while preparing an audit assignment. Data were collected through interviews. Besides resulting in an information literacy process model, it was found that the knowledge worker reacted differently from the students in the ISP-model. They started their work with *confidence*, but this changed into stress and frustration when their ideas did not correspond with the information gathered, which implied a delay in their work. Further, when finalising their ideas they did not feel happy, rather anxious about how their work would be judged and valued and if they would add value to the company. It was found that feelings associated with seeking and using information were tied closely to whether they were

getting their work done within prevailing constraints. These findings further highlight the contextual impact on information seeking and use.

A recent study (Holliday & Li, 2004) has reported on the information seeking behavior of the Millennial Generation of undergraduates students compared to the behavior inherent in the ISP-model. Based on a qualitative research approach involving 35 undergraduates, the ISP-model was found to hold for many of the students in the study. However, the web allowing for easy access to information was preferred to the library as the students' primary source, which in turn led many students to skip steps in the process, e.g. the focus formulation stage. They often stopped searching after their preliminary searches, thinking they had completed the research process. In addition to students' experiences of uncertainty and relief, the feeling of 'frustration' was identified as a result of a mismatch between the easiness and outcome of web searching, Though the results to a large extent corresponded to the ISP-model, the concept of 'enough information' underlying the ISP-model was further questioned by this study. According to the stages of the ISP-model, for example, it is assumed that people start writing on their assignments when they have formulated a focus or have encountered enough information. However, we may question to what extent 'enough' or search closure is determined by exhausting sources - as also touched upon by Kuhlthau (2004, p. 42). If we take the work task dimension into account, search closure may as well be determined by 'work task closure' in terms of a given deadline indicating that no more time is left for searching - or it may by associated with personal factors, e.g. that the information seeker may *perceive*/*feel* that he/she has enough to present. Since the focus formulation element is crucial to the ISP-model, these approaches to 'search closure', except for the exhaustive search, may imply that information seekers do not always go through *all* of the stages in the ISP-model, e.g. do not formulate a focus that results in a focused search after pertinent information, as further demonstrated in the study by Holliday & Li (2004). Kuhlthau (2004, p. 68) has touched on this subject herself in her description of the emotional experiences associated with the final stage of the ISP-model. Based on findings from the five empirical studies, the information seeker experienced feelings of satisfaction if the search had gone well, whereas the opposite resulted in disappointment. These emotional experiences, however, have primarily been addressed in relation to *search* behavior.

Besides Kuhlthau's identification of personal factors associated with level of expertise, that is novice or expert, information seeking behavior may also be affected by type of personality. In a study of personality and information seeking based on the ISP-model, Heinström (2002) explored how and why personality traits influence information strategies and guides the information behavior. Based on the results from 350 university students, the study showed that the information dimension could be connected to all the personality dimensions tested in the study, that is neuroticism, extraversion, openness to experience, competiveness and conscientiousness. The impact of 'mood' as a psychological and personal factor already identified by Kuhlthau (1991), who builds on Kelly (1963), was also identified by Heinström as a factor related to type of personality. It was further concluded that inner traits interact with contextual factors in their final impact on information behavior. The study by Heinström (2002) can be seen as a supplement to the ISP-model, addressing specifically the personality factor in the ISP. The study by Heinström (2003) is further addressed in section 5.2.1 concerning personality and information seeking.

As can be seen from the discussion above most of the studies employing the ISP-model have taken the context or work task into account, which may also be seen as a reflection of the 'holistic point of view'. These studies have highlighted the importance of *environmental* factors to information seeking behavior, which further seems to challenge the theoretical framework underlying the ISP-model, especially the emotional part.

The anxiety and uncertainty, for example, which drives the ISP was also found to be related to various forms of anxiety resulting from the work task. In addition, uncertainty and anxiety may not only occur in the beginning of the process. As the study by Cheuk Wai-Yi (1998) showed, it may also occur in the end associated with the end product, e.g. due to the quality assessment made by other people. However, the end product could also result in positive feelings expressed by relief in relation to the end of process. Further, dynamics of the work task *context* – or changes to the work task itself - may also result in uncertainty occurring at *various* points in the process. This was found to be associated with the problematic situation underlying information seeking. In addition, not only focus formulation may reduce uncertainty. As demonstrated in the

study by Warner & Procaccino (2004), persons serving as information sources or mediators during the problem solving process may also help reduce uncertainty[28]. Instead of perceiving the work task as an a priori condition, the study by Vakkari (2001) showed that studies of the information search process could benefit from relating the subtasks in the ISP-model to the work task elements in the task performance process. Search closure, for example, may not only be associated with 'enough information' due to an information need or topic, but may derive from constraints in the work task situation as well. Finally, findings from studies of personality and content of information in relation to the ISP have shown that the ISP-model could benefit from integrating these kind of elements.

Though the ISP-model has formed the basis of many studies on information seeking behavior and has contributed to our knowledge and understanding of information seeking behavior, recently also in context, all previous studies have focused on the *individual* information seeker. No study has investigated how the model will apply in a collaborative or group based setting. Kuhlthau herself mentions 'collaboration' (2004, p. 135), but in conjunction with other strategies to be employed in relation to meaning construction - not as a condition from the outset that should be further taken into account. Limberg's study (1998) involved 5 groups of students, but the outcome associated with the group setting was a side effect, not *the* research focus of interest. Byron & Young (2000) studied the ISP-model in the context of virtual learning in groups, but this aspect was not the focus of the study, but an "unexpected factor…[and] one area for further study…" (Byron & Young, 2000, p. 264). In addition, the latter study was based on one single data collection technique, the process survey, which calls for the employment of more techniques to further validate the result. Hence, the ISP-model and the assumption that the information seeker is an individual needs to be challenged and further explored.

[28] The mediator may, however, also on his/her side encounter uncertainty, e.g. due to the work task situation

As another example of the individualistic cognitive view that also serves as part of the theoretical framework related to the process of meaning making, Dervin's Sense Making approach should be presented. In addition, it can be seen also as an example of one approach that has developed towards the holistic cognitive view in information science since its first appearance in the early cognitive period.

2.2.3 Dervin's Sense Making approach

The Sense-Making approach[29], was developed by Brenda Dervin and Michael Nilan (Dervin & Nilan, 1986) out of a need for a new research approach to information needs and seeking that focused on subjective information constructed by information seekers as opposed to objective information; active information seekers as opposed to passive receivers of information and situations in which the person acts, as opposed to situation independence. Central to this new approach – and in line with the cognitive approach - was that information needs, seeking and systems should be seen from the user's point of view. Hence, the Sense-Making approach has also been associated with a shift in research emphasis from information sources to information users.

Since 1972, the Sense-Making approach has been developed by Dervin and colleagues (Dervin, 2003; 2005b) and evolved into a generalized communication-based methodology seen as useful for the study of *human sense-making* (and sense un-making) in any context. According to this approach, information seeking and use may be defined as *communicative practices* and, consequently, also the practices of researching information needs and seeking. The focus is on *constructing* and *meaning making* by digging into what constitutes a certain experience. According to Dervin and Frenette (2003), sense making may involve the making or using of an idea or both; cognitions, thoughts and conclusions; attitudes, believes and values; feelings, emotions, intuitions and memories, stories and narratives. In the most general sense, 'sense-making' may be defined as behavior, both internal (e.g. cognitive) and external (e.g. procedural), which allows the individual to construct and design his or her movement through time-space (Dervin, 1999). In addition, this behavior is situational and contextually bound as well as rooted in present, past and future time-space. Hence,

[29] Sense-Making in capital letters is used to designate the methodology in contrast to the concept of 'sense-making'

human sense-making cannot be described or explained from personal traits alone – as proposed by the early individualistic cognitive viewpoint.

As a methodology, Sense-Making refers to a coherent set of concepts and methods used to study *how* people construct sense of their worlds, e.g. how they construct information needs and uses for information in the process of sense-making. It basically rests on four dimensions: *situation, gap, bridge* and *outcome* as shown in Figure 2.8. 'Situation' refers to the time-space contexts in which sense is constructed; 'gap' refers to the gaps people perceive and which prevent them for moving (e.g. a knowledge gap), and hence is needed bridging. It may, for example, be translated as the questions people have as they construct sense and move though time-space; 'bridge' refers to the experiences that bridge between gab and outcome, and 'outcome' refers to the impact, effect and consequences as well as the helps or hindrances of bridging and making sense. 'Time-space' indicate the dynamic and chaotic nature of sense making which is contextually bound as well as rooted in time.

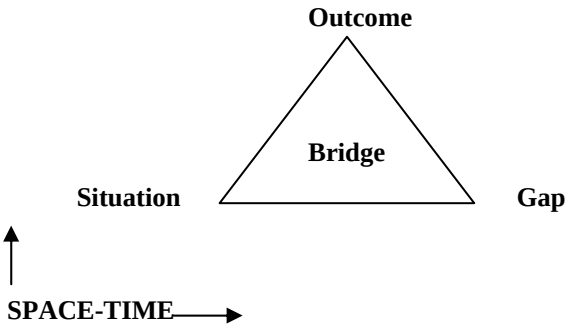

FIG. 2.8. The Sense-Making dimensions Situation, Gap, Bridge and Outcome.

(legend in text)

To make the Sense-Making approach operational and help collect or analyze data, Dervin (1983) has introduced and further developed the *micro-moment time-line interview technique*. It is derived from anthropology, ethnography and clinical

psychology and focuses on a relevant and critical past incident in the informant's life[30]. During a micro-moment-time-line interview, the informant is asked about what happened in a single situation – step by step - relevant to the research focus. The interview is based on the four dimensions of the Sense-Making process and various variables associated with each dimension. In this way, the interview focuses on the informant's situation, gaps, bridges and outcome in relation to the Sense-Making Process. The views presented by the informant may be vague and incomplete, but the concrete real past incidents and the detailed Sense-Making interview technique may help the informant to report on situations, gaps, bridges and outcome in a more focused and reliable way. The micro-moment time-line interview technique is further described in connection with the data collection methods employed for case study 2 in chapter 8.

Another interview technique derived in 1981 from the Sense-Making approach (Dervin & Dewdney, 19869 is the *neutral questioning technique.* It focuses on the respondent's need or questions addressed from his/her point of view. The neutral form of questioning has guided users in expressing an information need in their own words that may help an interviewer understand what the underlying situations, gaps and uses may be. This technique has been applied particularly in relation to the reference interview situation.

Sense Making has been applied in myriad settings, at myriad levels and within myriad perspectives (Dervin, 2005a), serving both as a tool for metatheoretical critique, a methodology for research, a theory about communication and as guidance for communication design and practice as well as a research tool. Sense-Making has also served to help understand intrapersonal, interpersonal, small group, organizational, national and global communication practices – and been applied in conjunction with various philosophical viewpoints (Tidline, 2005). Most recently, it has been used to understand contexts and processes of information need, seeking and use. Sense-Making stresses individual rather than collective understanding. This, however, does not mean that Sense-Making is limited to individual cognition only or that it may not be employed for explaining group and organizational information exchange or

[30] The micro-time-line interview technique is a variation of the 'critical incident method' for data collection. It focuses on a recent concrete incident to collect data on a phenomenon (Ingwersen & Järvelin, 2005, p. 91)

communication processes. Tidline (2005, p. 114) points out that current Sense-Making tenets consider the dynamic influence of time, space, cognition, affect, power, culture, and of individual and collaborative sense-making.

Some of the criticism towards the approach, especially the early conceptualization of Sense-Making (e.g. Ingwersen & Järvelin, 2005; Wilson, 1999), regards its abstract and general level. Based on this, it is difficult to apply the model in order to understand information seeking in various (work) contexts as well as suggest testable hypothesis.
However, according to Ingwersen & Järvelin (2005, p. 62), the Sense-Making approach represents an essential step forward in information seeking from a cognitive point of view. It has drawn attention to individual sense-making – also as a social phenomenon - and problem solving in varying situations. By focusing on the individual and his/her process of constructing meaning, it has opened up the *chaotic* variety in real information behavior and provided a methodology for dealing with this. In addition, the Sense-Making approach has pointed out a new approach to the concept of information (Pettigrew, Fidel & Bruce, 2001). Instead of addressing information as static objective units to be described and retrieved in information systems, Dervin (1983) has introduced information as *constructs* that may derive also from dialogue and communication. Further, information creating, seeking and use should not limited to cognitive experiences only – it may as well involve a variety of emotional and affective experiences; finding information, for example, may not always result in a positive outcome. Further, studies of information seeking behavior should not be limited to the present, but include also the past and the future (Pettigrew, Fidel & Bruce, 2001; Ingwersen & Järvelin, 2005).

To sum up the section of the *individualistic* cognitive viewpoint, research resting on this approach has primarily focused on explaining variations in information behavior according to characteristics or attributes of the *individual* and of the processes in which the individual has been involved. It has contributed to an understanding of what characterizes an individual information seeker's problematic situation - due to a *cognitive* 'anomaly', problem or need. In addition, it has contributed to the design of information (retrieval) systems from a *user oriented* perspective. A range of cognitive conditions and emotional responses has been found to arise when people engage in information behavior. Further, it has been suggested to regard information seeking behavior as a *process* - or set of processes and stages - through which the individual

moves in space and time while constructing meaning and making sense. In addition, various qualitative methods have been found for mapping these processes and observing the variations and patterns of behavior that emerge, e.g. as demonstrated in the development as well as the various employments of the ISP-model.

A number of researchers have attempted to generalize from observations of individuals or groups of individuals across contexts, which have resulted in various models of the information seeking process, Kuhlthau's ISP model being one of them. The ignorance of context has, however, been one of the central points of critique against the cognitive viewpoint. When 'environment', 'context' or 'situation' has been mentioned in studies relying on the cognitive view, it most often has referred to aspects *a priori* to the information seeking process – and not to attributes of the social, professional or information seeking *setting* or problem *situation* that initiated the information behavior.

The next section presents the *social approaches* in information science, that is, research into the *social* and *collaborative dimension* of information behavior – theoretically and empirically.

2.3 Social approaches

According to Pettigrew, Fidel & Bruce (2001), social approaches to studying information behavior emerged slowly in the 1990s. In focusing on the social aspects of information behavior, the aim has been to understand the impact of interpersonal relationships and the dynamics on information flow and how information sharing form part of human communication. The focus has been on the meanings and values associated with social, social-cultural and socio-linguistic aspects of information behavior.

As a reaction and in contrast to the dominating cognitive approach to information behavior in information science, the frameworks underlying social approaches to information behavior consider 'context' interpretively and holistically - and as a carrier of meaning. Moreover, a new conceptualizing of 'information' has derived from the shift in research approach. According to Tuominen & Savolainen (1997), for example, 'information' should be seen as a *communicative construct* – rather than an entity with fixed boundaries or as a commodity that may be *transferred* through communication.

Further, the study of 'information use' should not be considered in terms of an isolated individual or outside a specific context but as bound to its *social* or *situated* context.

In addition, information behavior may be affected more by the kinds of *social networks* in which information seekers are involved than by individual attitudes and attributes. Haythornthwaite & Wellman (1998) introduced the social network approach to study how, for example, scholars' social ties and types of information exchanges in social networks affect their choice of medium of communication. Theories derived from studies outside information science such as social network studies, studies of team collaboration and research within the field of computer-supported collaborative work (CSCW)[31] may also be employed to the study of collaborative information behavior.
Also the emerging field of *social navigation* (Munro, Höök & Benyon, 1999) offers a new way to look at computer based information behavior. This field examines how we navigate information spaces in real and virtual environments, how we orient and guide ourselves, and how we interact with others to find our way. Understood widely, "[s]ocial navigation considers the creation of social settings and 'places' in information space and behavior in them, the sociality of information creation, people as members of groups and nature of information itself, its location, evaluation and use" (Munro, Höök & Benyon, 1999, p. 2-3). This approach focusing on computer applications also brings a new way of thinking about how we design information spaces that turn human-computer interaction into a more social experience, emphasizing our need to collaborate with others and follow the trails of their activities in these spaces. According to Munro, Höök & Benyon (1999), social computing, in the sense of our individual actions being designed around collective social behavior, is not just something that is 'layered on top of' a space, but has come to transform both the space and the ways that people act within it.

The shift from the individualistic to the social research approach and focus is also demonstrated in the various studies of information behavior implying *collaboration*.

[31] When looking into other research domains such as CSCW (Computer Supported Collaborative Work) and social psychology, social issues such as group dynamics and group behavior have a much longer tradition.

2.3.1 The concept of collaborative information behavior

Collaborative information behavior is an interdisciplinary phenomenon and definitions vary according to the assumptions of the academic discipline within which the research is conducted (Foster, 2006). However, previous work on collaborative information behavior (CIB) can be characterized by the importance of *social factors* to acquiring, retrieving, seeking, managing, sharing and generating information. Following from this, CIB is not restricted to collaborative information seeking (CIS) or collaborative information retrieval (CIR) activities only, but also defined here to cover the *broader* set of collaborative activities (acquiring, managing, generating etc.) – in line with Wilson's (1999) nested model of information behavior, and the holistic cognitive view by Ingwersen & Järvelin (2005) as presented in section 2.5.3.

2.3.2 Previous work on collaborative information behavior

The research interest in the *social* dimension of information behavior has only recently been reflected in the library and information science (LIS) literature. However, some common patterns of the social approach to information behavior may be identified.

Collaboration in information seeking and retrieval has until recently been closely identified with the reference interview (Proctor et al., 1998). Through a series of communicative interactions the requester and the librarian have been trying to clarify what the requester was looking for and what the library has to offer in that regard. In recent years, studies on collaborative information seeking and retrieval activities have tended to focus on how *technology* may enable new forms of collaboration or provide referral services in new ways. The main foci have been on strategies such as collaborative filtering (e.g., Goldberg et al., 1992; Maltz & Ehrlich, 1995) and collaborative browsing (e.g., Lieberman, van Dyke & Vivacqua, 1999; Twidale, Nichols & Paice 1997). However, while the studies have investigated information transfer in collaborative settings, they have rarely examined the *process* of information seeking. Moreover, some of these studies have ignored the fact that the process of information seeking may be carried out *collectively.*

Only few information seeking and retrieval studies have provided empirical knowledge of the *involved collaboration* (e.g.. Allen, 1977; Bruce et al., 2003; Fidel et al., 2000; Hansen & Järvelin, 2000; 2005; Hertzum, 2000; 2002; O'Day & Jeffries, 1993; Prekop, 2002; Sonnenwald & Pierce, 2002; Talja, 2002). Common to most of these studies,

mostly of *longitudinal* nature, is the focus on engineers' information-seeking behavior. The studies show, however, how social and collaborative aspects may affect information behavior and the problem solving process. In addition, they demonstrate how the work context and the work task influences the participants (information seekers) involved, the information sources retrieved and used as well as the outcome of the problem solving process. These studies are presented below as part of the theoretical framework and as an argument for the present study on group members' information behavior. The most well known example of collaborative information seeking in this context is probably Allen's (1977) identification of the gatekeeper phenomenon, based on a study on engineers and scientists information seeking behavior. According to Allen (1977), the gatekeeper takes the responsibility to look for information and forward it to colleagues in his or her team or organization. In this way, the recipient of the information and the gatekeeper collaborate to find information that is useful to the work they are engaged in. Besides identifying a difference in the two group's information seeking behavior, e.g. their choice of information sources, the importance of personal contacts and discussions was found.

Prekop (2002) explored the information-seeking behaviors of a military working group established to review the Australian Defence Force's command and control capability. In this three-year project, Prekop identified seven different information-related roles that were explicitly assigned to project participants or informally adopted by them. The mapping between roles and project participants was dynamic and changed with the participants' workload and other responsibilities within the project as well as with the progress and staffing of the project.

Hertzum (2000; 2002) investigated how a group of software engineers assessed and chose their information sources. It turned out that whenever an engineer made a decision based on a given source the whole project became dependent on it. Consequently, discussion of sources became a recurrent issue at the project meetings. Indeed, one of the important roles of these meetings was to provide a forum for collaboratively reviewing the trustworthiness of sources that were being used or considered for use. Furthermore, it appeared to be a well-established conversational practice to accompany the mentioning of sources that might be new to some project participants with information that put these sources in context. Thereby otherwise

unknown sources inherited an initial face and grounding from other people already known to the engineers.

O'Day and Jeffries (1993) investigated the sharing of information within group situations which resulted in the identification of information sharing at four levels: 1) sharing results with other members of the team 2) the broadcasting of interesting information 3) acting as consultant and 4) handling research requests made by others. These levels of information sharing have been further challenged by Talja (2002) in a study of scholars' information sharing.

Based on an explorative case study of the collaborative activity of information sharing, Talja (2002) has developed a conceptual framework for the description of types and levels of information sharing in relation to document retrieval in academic communities and groups. According to her, collective aspects of information behavior have often been conceptualized as 'one-way' processes in which an individual consults another individual, such as consulting, informal communication, use of person sources and peer influence. However, information acquisition and filtering often takes place as a *collective* and *collaborative* activity.' Adopting a focus on document retrieval, information sharing in academic research community may take the following forms: 1. sharing information *about* (relevant) documents, 2. sharing relevant *documents*, 3. sharing information about the *contents* of relevant documents and 4. sharing information about novel and efficient *ways of finding* relevant documents or information sources. To further explore the information sharing practice in relation to document retrieval in different academic communities, Talja (2002) interviewed 44 researchers from nursing science, history, literature and cultural studies and ecological environmental science. Besides their personal seeking activities, each participant was asked about his/her group activities and collaboration - at the group level as well as at the department level. In stead of typologizing individual scholars according to the individual's attitudes, attributes and information seeking style, sharing was regarded as a social and cultural phenomenon, which resulted in the identification and classification of five types of information sharing: 'strategic sharing', 'paradigmatic sharing', 'directive sharing', 'social sharing' and 'non sharing'.

Strategic sharing refers to information sharing as a conscious strategy of maximizing efficiency in a research group. Searching was done on behalf of the group, but

acquisition decisions were made collectively in the group. When individual researchers located relevant articles, they copied them simultaneously to the group members. Both information about documents, their contents as well as the documents themselves were shared. In addition, experiences with technical features and strategies were shared and discussed.

Paradigmatic sharing refers to information sharing as a means of establishing a novel and distinguishable research approach or area within a discipline or across disciplines. Like strategic sharing, paradigmatic sharing is goal-oriented and typical for research groups that have been formed around new areas of interest, new methods or research paradigms. These groups are often temporary and gathered around a collaborative writing project or larger and more loosely structured groups. They commonly strive for a new understanding or methods in their field of interest. Group members may engage in collaborative seeking, filtering and interpretation of documents.

Directive sharing refers to information sharing between teachers and students. The two-way process of information sharing determined by mutual interests and goals is emphasized. This is in contrast to 'information giving', which refers to the conceptualization of the one-way process, implied when a mentor – or a librarian - suggests relevant to a student. Directive sharing was found to take the form of sharing information about documents and strategies as well as the documents themselves. Sharing the contents of documents is more seldom, since students are expected to read on their own.

Social sharing refers to information sharing as a relationship and community building activity. Social sharing is not strictly goal-oriented; rather, it most often resembles the practice of giving and receiving 'gifts'. In essence, it builds and maintain social relationships, developing communality. It may be seen as a sign of respect and that the information receiver's work is acknowledged. Whereas information about relevant documents is often shared, information about document *contents* is less often shared.

Finally, *non-sharing* refers to research projects that may be so unique that information seeking cannot be delegated to others. Non-sharing takes place in the academic research community, when the community as a whole cannot provide information about relevant documents to one of its members. Hence, it does not refer to the condition of holding

back information, for example due to competition, as demonstrated by Sonnenwald & Pierce (2000) in a study of human information behavior in a command and control military context which is presented below.

Besides the identification of various types of sharing, the study by Talja (2000) also highlighted information sharing as a *natural* and *common* dimension of collaborative information seeking behavior. Kuhlthau (2004) has also pointed to information sharing as a strategy, especially at the first stages of the ISP, but she did, however, not address this issue any further.

From a task-based approach, Hansen & Järvelin (2000; 2005) have investigated information seeking and retrieval processes performed by patent engineers in a real-life work setting. The first study showed that the patent engineers were involved in different collaborative activities such as collaboration related to internal or external activities and collaborative activities related to individual *or* group related activities. The latter study reported in 2005 further explored the expressions of collaborative activities within information seeking and retrieval, associated with the process of the patent work task. They found that collaborative activities of information seeking behavior take place throughout the work task process and may even be categorized according to the specific work task steps.

Bruce et al. (2003) analysed two design teams during the initial stage of a software-engineering project and an aviation-engineering project. With respect to information seeking, collaboration took place when the engineers were identifying, analysing, and defining their information problems, as well as when devising strategies for information seeking. The act of retrieval itself was generally performed individually. Apart from this general pattern, the work context seemed to have a strong effect on the engineers' collaborative information-seeking behavior. The engineers in the two projects differed in how they solved their information problems and in how they utilised each other and their project-external colleagues.

Sonnenwald & Pierce (2000) reported on a qualitative study exploring human information behavior in a command and control military context. During data analysis, three important themes emerged, highlighting the 'why', 'what' and 'how' as well as the consequences of information behavior. The first theme was the concept of

'interwoven situational awareness' consisting of individual, intragroup and intergroup-shared understanding of the situation. Situational awareness appeared to facilitate response to dynamic, constrain-bound situations. The second theme described the need for 'dense social networks' or frequent communication between participants about the work context and the situation. The third theme dealt with 'contested collaboration', the phenomenon where team members maintain an outward stance of cooperation, but actually work to further their own interests, some times destroying the collaborative effort.

Apart from these empirical studies, Karamuftuoglu (1998) has outlined a theoretical framework for understanding the collaborative nature of information seeking. The core of this framework is that information seeking is just as much about producing new knowledge, that is, a creative and inventive activity, as it is about finding extant information. He addresses two knowledge functions of documentary IR, which systems should support: transferring knowledge and producing/creating new knowledge, where the last one is dependent on social networks and relations. This ties in with the field of social navigation (Munro, Höök & Benyon, 1999), the work on social intelligence (Davenport, 2000) and with attempts to subsume support for information seeking in the broader area of group support (Romano et al., 1999). Further, the importance of social knowledge to information seeking has been investigated by Soininen & Suikola (2000) in relation to seven professional workers' information seeking behavior on the Internet. Based on various open-ended search tasks, it was found that social knowledge, e.g. the knowing of domain expertise, was used when selecting a source or place where to start looking, while examining results and extracting information and when reflecting and making decisions to proceed or stop seeking.

To sum up the section on social approaches, the change in study from the individualistic to the social dimension of information behavior has resulted in a new conception of the information seeking process as well as the involved sub-tasks, such as acquiring, retrieving, seeking, managing, sharing and generating information. In addition, the *dynamics* of social interaction and the context framing information behavior have been acknowledged as important factors that also need to be taken into account to reach a deeper understanding of information behavior. The social approach, however, has only recently become a research focus in information science – compared to other disciplines, such as social psychology and sociology. Since the 1990s, the

conceptualization of ‘social’ has emerged from referring to the ‘one-way’ process’, meaning the delivering of information from one to another, to the collective and collaborative activities involved in information behavior.

As demonstrated in the previous studies and work on CIB, social aspects affect information (seeking) behavior in various ways – both at the individual and the group level. The focus, though, has primarily been on the collaborative behavior of engineers, whereas only few studies have focused on the collaborative behavior of academics, that is, students and researchers. Further, the behavior studied has tended to be concerned with the *roles* of group members or their *motivations* for either seeking, selecting, assessing, using and sharing information in specific ways associated with a specific work task situation. No study has investigated academic group members’ information behavior in terms of the interplay between activities and cognitive and affective experiences, as demonstrated in the ISP-model, and further, how these may be associated with social and/or contextual factors.

The next section addresses the social-cognitive viewpoint in relation to the study of group members. It challenges the traditional individual-social dichotomy by highlighting the distinction *as well as* the interrelation between individual and group. The socio-cognitive viewpoint has traditionally been employed in connection with organizational studies. However, this approach, especially with regard to the ‘individual-group’ relation - may also guide the study of group members’ information behavior.

2.4 The social-cognitive approach

The social-cognitive approach aims at understanding human *social* behavior, involving the investigation of mental processes of people interacting with one another. Specifically, social cognition examines aspects of the mental processes of human information processing, what it influences and what it is influenced by within the *social interactions* of groups (Akgün, Lynn & Yilmaz, 2006).

Despite that the term ‘social cognition’ has gained ascendancy as the preferred term under which to classify a wide variety of research issues concerned with cognitive processes in social psychology (Larson & Christensen, 1993), the term ‘social’ has

previously been associated with either the content of cognition or with the class of factors that can affect cognition, here understood as something that merely happens inside the individual. However, when applying the term 'social-cognition' to denote the intellective phenomena at the *group level* of analysis, another meaning can be ascribed to the term. As suggested by Larson & Christensen (1993, p. 6), 'social cognition' may be defined as "…the social processes… that relate to the acquisition, storage, transmission, manipulation and use of information for the purpose of creating a *group-level* intellective product". In this perspective, cognition is not cognition about, but cognition *by*, with the word 'social' referring to the way in which cognition is accomplished. At the group level of analysis, cognition *is* a social phenomenon.
According to this conceptualization of social-cognition, it is important not to confuse the individual-level and group-level cognitive events. Individual and social cognition are clearly different things. To recall a piece of information from memory, for example, is not the same as mentioning that item in a group discussion, though they serve the same function. It depends on the level of analysis. Concerned with the group level of analysis, aspects of group problem solving that reflect genuine group level intellective processes are in focus. Hence, social cognition differs from the cognitive processes operating within the individual. Further, social cognition does not replace or can take place in the absence of individual cognition. Rather, social cognition *depends* upon and is *supported* by individual cognition. Moreover, individual problem solving differs from group problem solving, meaning that individual problem solving may only serve as an *informal* model for what may occur in groups, that is, what intellectual processes that may occur to result in group problem solving.

The social-cognitive approach is rooted in the individualistic cognitive viewpoint. Though, the cognitive approach traditionally has addressed the individual level, the growing interest in this approach to organizational studies led to its extension to the group and organizational level of analysis. According to Allard-Poesi (1998), this resulted, however, in the assumption that an organization is formed by social constructions based on its members' *collective* cognitive schema. Further, derived from the cognitive approach in organizational studies, individual schemas were assumed to become similar as a result of shared experiences, contexts and constraints or as a result of exposure to social cues regarding other people's construction of reality. In addition, these systems of shared beliefs were believed to influence members of the organization to *fit* its goals and expectations. This notion of 'shared ideas and beliefs' had for a long

period been regarded as crucial to the understanding of decisions processes, organizational action and performance as well as change and learning in organizations. However, due to empirical studies and the identification of conceptual and methodological problems concerning the assumptions underlying the cognitive approach, this paradigm was questioned. Hence, the homogeneity or congruence in individuals' representations within groups or organizations may no longer be taken for granted.

In a critical review regarding the employment of the individualistic cognitive approach to the study of collective cognition or representations in organizations, Allard-Poesi (1998) advocates for a social-cognitive approach according to which the unit of analysis is changed from the individual/social levels to *interactions*[32]. Instead of the focus on 'shared beliefs', collective cognition should be related to the socio-cognitive *dynamics* occurring between *interacting* group members, whereas *processes*, such as communication, become critical to the construction of collective cognition. A 'collective representation' may then be understood as the processes and products of a social and cognitive elaboration of reality, that is, based on processes of exchange and interaction (Allard-Poesi, 1998). According to this social-cognitive approach, social aspects do not only constrain and affect the individual's cognitive representations; the individual him/herself constructs his/her own representations that may as well contribute to the generation and modification of social representations. In this sense, the individual should not be regarded as a *mere* reflection of social influences, but rather as both a goal *and* a source of influence. In turn, cognition is not only an intra-individual process but determined by elements that are fundamentally social. Given that the social and cognitive dimensions interact, social influence should no longer be conceptualized as a *unilateral* and conforming process only according to which the individual modifies his or her behavior or attitude to those of the group. Rather, it should be conceptualized as a *dynamic* process that may also result in change or innovation.

The social-cognitive approach highlights the mutually permeable character of the social and cognitive fields. In this way, 'collective representations' should be understood as

[32] The interactive view of the cognitive and the social aspects is not new but has been addressed by researchers in social and cognitive psychology (e.g. Moscovici, 1988).

both expressed *and* constructed in and through interactions between group members. Unlike the cognitive view, the social-cognitive approach suggests, for example, that *various* mental representations may exist in groups or organizations and that these representations are continuously changing. Further, members develop *different* forms of collective representations, which depend on the socio-cognitive processes taking place during interactions. These phenomena depend not only on the representations previously held by organizational or group members, but also on their involvement in the work task, on their participative mode during a decision process and the norms induced by their tasks and by the social context (Allard-Poesi (1998).

As pointed out by Akgün, Lynn & Yilmaz (2006), the social-cognition approach transcends beyond the cognitive approach, emphasizing individual cognitive processes, and the structural approach, emphasizing organizational and group routines.

The social-cognitive approach is further addressed in chapter 3 concerning the *social dimension* of information behavior that is the group and social-cognitive processes and interactions implied by group work that may affect the individual group members' information behavior.

The next section addresses the *contextual dimension* of information behavior, that is, a conceptualization of 'context' or the frames of reference that may affect information behavior.

2.5 Information behavior in context

Context is 'hot' in information science as well as in a numerous other disciplines (Talja, Keso & Pietiläinen, 1999). In an analysis of various contextual approaches, Dervin (1997, p. 14) concludes that there is no term more often used, less often defined and, when defined, defined so variously as context. Besides having become an almost ritualistic invocation, context has the potential of being virtually anything that is not defined as the phenomenon of interest (Dervin, 1997, p. 14). Depending on the paradigmatic approach to context, that is, objectified/positivistic or interpretative/social-cultural (Dervin, 1997; Tajla, Keso & Pietiläinen, 1999), context in LIS may be conceptualized either as another analytic factor that should be taken into account along with other factors or as a carrier of meaning without which any possible understanding

of human behavior become impossible. In addition to the latter, every context is by definition different and generalization in the traditional sense is impossible (Dervin, 1997). In practice, context in LIS studies usually refers to any factors or variables that are seen to affect individuals' information seeking behavior such as problem situations, tasks, persons, communities and organisations, cultures, and work roles.
In addition to the various approaches to context, the concept of *context* is often confused with *situation*. Hence, the first two parts of this section address the characteristics of each concept, that is, as two distinctive, yet, dependent and interacting phenomena which frame and interact with individuals' information behavior. On a theoretical level, the concept of context and situation has the potential for bringing together both the individual cognitive level and the social level of analysis of human information behavior (Cool, 2001).

The contextual orientation towards information behavior underlying the *holistic* cognitive viewpoint presented by Ingwersen and Järvelin (2005) demonstrates a new and revised approach to understand the complexities of information seeking behavior and interaction. This approach is addressed in the last part of the section and, further, closes the chapter on various approaches to information behavior.

2.5.1 The concept of context

It is generally recognized that information seeking and information retrieval are inherently interactive processes, which occurs within multiple overlapping contexts that inform, direct and shape the nature of behavior and interaction (Cool & Spink, 2002). Hence, information seeking among others takes place within multidimensional contexts, which can be analyzed from multiple levels.
Despite the growing attention to 'context' and context related issues in LIS, no single definition exists of what the concept entails, or what the meaningful constituent elements of context are that are important to information behavior.

According to Allen & Kim (2001), context is the *socially defined settings* in which information users are found, such as a work or task setting). Within each of these broad contexts different situations occur, that is, individuals may be *situated* in different ways in the context. Following from that, a context is larger than a situation. Further, a context may consist of a variety of situations just as different contexts may have different possible types of situations (Sonnenwald, 1999).

From a social-cultural perspective, contexts are frameworks of meaning (Dervin, 1997) and situations are the dynamic environment within which interpretive processes unfold, become ratified, change and solidify (Cool, 2001). In addition to that, context may be defined as the specific situated historized moments in time space, that is, the spatial and temporal confluence of people, settings, activities and events (Altman, 1986). It is the quintessence of a set of past, present and future situations (Dervin, 1997). Each context has boundaries, though malleable, flexible and subject to change as well as constraints and privileges as perceived by its members (e.g. academia, family life, clubs). This may, however, not be identical across members or complete (Dervin, 1997; Shutz & Luckman, 1973).

Despite the ill-defined nature of 'context', attempts have been made to describe the salient levels of contexts in LIS (Cool & Spink, 2002) which to a large extent correspond to the levels present in Wilson's (1999) information behavior model: the information environment level, the information seeking level, the IR interaction level and, finally, the query level. Though addressed as discrete units, these levels are overlapping and related levels of context.
At the first level, context can be construed as the information environment within which information behavior takes place, such as work task settings. The contexts within which a person seeks information consist of cognitive, social and other factors related to a persons' tasks, goals and intentions, which precipitate the information seeking process (Cool & Spink, 2002). Research within this level explores the social and environmental factors that influence human information behavior, including information seeking and retrieval. The next level concerning the information seeking context focuses on the goal(s) that a person is trying to achieve, or some problem resolution task that influences the IR interaction level. Stages in a search process or information use may for example be addressed at this level of context. The IR interaction level is concerned with the context of the interactive space itself, whereas the query level explores the linguistic level of context in association with system performance. Following from the conceptualization of context above it may be argued then that each of the last three levels of context may as well constitute a 'situation' of the contextual level above. Hence, 'situation' does not only refer to the interaction situation; *many* types or levels of situations may frame information behavior.

2.5.2 The concept of situation

In line with context, the concept of situation has got increasing attention over the past decade (Cool, 2001). However, as was the case with context, no single definition of 'situation' exists; it varies across individual, social and environmental level of analysis (Cool, 2001). Based on the critical review of 'situation' in LIS (Cool, 2001), *situation* may, however, be conceptualized as the *dynamic* aspect of context, constituting a set of related activities or related stories. It is the set of regulative norms governing behaviors within broader contexts made up of roles and role sets with prescribed norms. Within each context a *flow* of situations may arise; e.g., within the context of academia, teaching a course and attending a meeting are examples of two different types of situations within the same context. Situations are not necessarily linearly ordered discrete events. In addition, individuals may describe the same situation somewhat differently, e.g. see different connections among actions based on previous experiences and knowledge of similar situations. Moreover, situations from different contexts may be interleaved.

One situation that has served as an analytic construct in LIS for more than two decades is the *problematic* situation. From a focus on the individual-cognitive level, the research interest has moved away from purely individual-level analysis to more holistic perspectives, taking into account *also* the social level of analysis. This is demonstrated in the next section on the holistic cognitive viewpoint in LIS.

2.5.3 The holistic cognitive viewpoint

Since 1990, perspectives and models of information seeking and retrieval (IS&R) relying on the cognitive viewpoint have developed into an integrated conceptual framework for research, also known in LIS as the *holistic cognitive viewpoint* (Ingwersen & Järvelin, 2004; 2005). This framework reflects an understanding of IS&R as a *process*, involving various cognitive and emotional actors or teams in context. 'Actor' refers to a variety of human constructs or representations of cognition, reflection, emotion or ideas forming part of the IS&R components and the various kind of interactions in context, such as authors, human indexers, designers of database structures and interfaces, information seekers and communities of individuals organised

in social, cultural or organisational contexts[33]. The perceived *current* context as well as the actors' experiences (*historic context*) play central roles for the personal cognitive construct of a situation, e.g. in a work task context (Ingwersen & Järvelin, 2005).

The work task (or daily-life task or interest) situation constitutes the central element of the holistic model. It triggers the cognitive space of the human actor into a *perceived* work task, a problematic situation and a perceived information need. It is further implied by the holistic approach that several *different* manifestations of the same situation may be available across actors at a given point in time - in line with the conceptualization of 'situation' presented above.

Figure 2.9. shows a generalized and conceptual model of the interactive information seeking, retrieval and behavioral processes and the participating actors (Ingwersen & Järvelin, 2005, p. 261).

[33] Contexts are seen as *historical*, e.g. constituted by the experiences and knowledge gained over time by the actor(s) dealing with a utility community and his/her peers, or seen as *current*, that is, the frames of reference nested around and within the components of the holistic model. Hence, contexts may be of social, cultural or organizational nature, associated with objects, systems and domains, searchers' work and daily-life task and emotional interests, intentionality and preferences

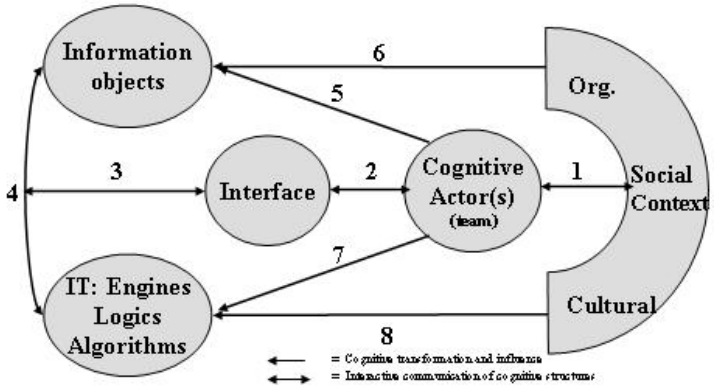

FIG. 2.9. Interactive information seeking, retrieval and behavioral processes.
Generalized model of any participating cognitive actor(s) in context. (Ingwersen & Järvelin, 2005, p. 261). Revision of Ingwersen (1992, p. 55). The numbers in the model deal with processes of interaction (1-4), e.g. social interaction (1), or refer to different kinds of generation and transformation of cognition and cognitive influence (5-8).

The model emphasizes the information processes involved in IS&R, but also encompasses processes of information behavior, such as use, creation and communication, in line with Wilson (1999). It consists of five central components, each consisting of data structures representing the cognitive structures of the actors involved in their generation, maintenance and modifications over time: The socio-organizational context may frame or interact with 1) the cognitive actor (or problem solver), 6) the information space holding objects of potential information value to the information seeker and 8) the IT-settings. The cognitive actor may interact with or influence 2) the interface, 5) the information space and 7) the IT settings. Further, the interface may interact with 3) the system side, that is the information space and the IT settings. Finally, 4) these two actors may interact as well. As emphasized by Ingwersen & Järvelin (2005, p. 284), work tasks are, however, not solely derived from the right side of the model; just like search tasks are not directed solely towards the left side. In stead, we may say that work tasks are directed *towards* the actor, while the search tasks are directed *away* from the actor.

The framework is not a static one, but flexible in the sense that it opens up for the study of many and different relationships, involving few or many components, as already

indicated. Further, when the actor in focus changes, the contextualizing actors of importance change accordingly. To give an example, a *group member* may be addressed at an individual level, hence representing the human actor in the role of an information seeker. The other group (or team) members then become part of the *social context* with which the individual actor interact, which is depicted below in the *Stratified Context (SC)-model* of 'group' (Figure 2.10). However, if the focus of interest shift to the group level, the *group* is addressed as a unit of information seekers and problem solvers, hence becoming the human actor, while other social actors, such as *other* groups, become part of the social context. This Figure of the generalized context model will be returned to in the rest of the present work to help signify which level, actor or relationship is in focus.

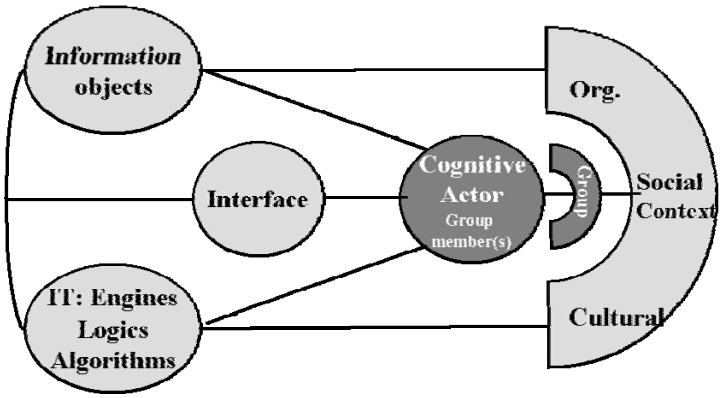

FIG. 2.10. Stratified Context-model of 'group'.

The individual group member acts as the cognitive actor, whereas the other group members constitute the *nearer* social context to that individual. (Modification of model in Ingwersen & Järvelin (2005, p. 261).

In addition to showing which components or actors that contextualize each other in a problem solving situation, the model may also serve as a framework for pin pointing specific research issues and theory to be employed or generated. To follow the individual-group example above, it may, for example be argued that the relationship (or interaction) between human actor and social/cultural/organizational context in the model represents various *degrees* of relationship. Determined by the problem-solving situation, the individual actor may perceive a stronger tie to other group members than, for example, to a supervisor or *other* groups. In this case, 'social contextual distance'

may be chosen as a research issue, e.g. explored from a 'social network' perspective involving social network theory that focuses on strong and weak ties in association with information behavior (Haythornthwaite & Wellman, 1998; Sonnenwald, 1999)

According to the perspective underlying the holistic model, the focus is on the individual but no longer solely from his/her context. Rather, each actor in the model of interactive IS&R interacts with other actors at various levels under influence of social contexts and work task (or interest) situations over time. This influence, however, does not *determine* the cognitive processes, rather, the perception, interpretation and cognition of the individual actor is determined by his or her prevailing *cognitive structures*, but *influenced* by the environment and domain (Ingwersen & Järvelin, 2005, p. 30). In this way, the focus is on the individual's *perception* of the situation in context. The influence, however, is bi-directional, meaning that the social/organizational environment is also influenced by the individual actor, hence, stressing the individual's *active* role in contextualizing (Johnson, 2003). Due to his/her perception of the situation and via social interaction, the actor may contribute to environmental change, e.g. in a community of practice or a scientific domain. This dynamic of influences is also named the *principle of complementary social and cognitive influence* (Ingwersen & Järvelin, 2005, p. 31).

The turn into a holistic cognitive view has implied a shift from *believing* in the possibility of bringing the variety of cognitive and functionally different structures in IR in harmony, to the *acceptance* that such structures are inherently different and should be exploited as such (Ingwersen & Järvelin, 2005).

2.6 Summary

This chapter has focused on the various approaches to information behavior with relevance to the study of group members' information behavior. The chapter may be seen from a historic perspective, reflecting and signifying a development from a reductionistic view of the individual information seeker and problem solver to an acceptance of the impact of social interaction and different contexts that dynamically change. In addition, the individual no longer need to be regarded as a passive receiver of information, but actually plays an active role in contextualizing. The chapter may also be regarded from a research perspective, reflecting and signifying the various and

integrated levels of analysis necessary to explore the information behavior of the *individual situated group member* in *context* over time. The *cognitive viewpoint* in LIS has highlighted how the individual person or user mediates or interact with information behavior over time, resulting in cognitive and emotional experiences and processes, as demonstrated in Kuhlthau's ISP-model. The focus has primarily been on *general* human attributes of the individual. The *social approaches* have demonstrated the social and collaborative dimension of information behavior, implying a shift from the isolated individual to the acknowledgement of the individual as bound to its social and situated context. Focus is here on communication, interpersonal relationships and roles, information flow and sharing involved in *collaborative information behavior*. Rooted in the cognitive viewpoint, the *social-cognitive approach* may be seen as an integration of the individual and social dimension of human social behavior, focusing on the mental processes involved when people interact with one another, e.g. in groups. The level of analysis, however, is not the individual, but the group, meaning that the focus is on *group problem solving*, rather than individual problem solving. In addition, unlike the cognitive view, the social-cognitive approach suggests that *various* mental representations may exist in groups or organizations and that these representations are continuously changing. Further, members develop *different* forms of collective representations, which depend on the socio-cognitive processes taking place during interactions. These processes depend not only on the representations previously held by group members, but also on their involvement in the work task, on their participative mode during a decision process and the norms induced by their tasks and by the social context. Finally, *information behavior in context* has demonstrated the importance of taken into account any *factors* or variables that are seen to affect individuals' information seeking behavior such as problem situations, tasks, persons, communities and organisations, cultures, and work roles. In addition, it has been emphasized to distinguish 'context' from 'situation' in the sense that context - as a carrier of meaning - frames any given situation, which, on the other hand, may be seen as constituting the dynamic aspect of context. An contextual approach to information behavior has been demonstrated by the holistic cognitive viewpoint, integrating earlier models and conceptualizations of information seeking behavior, hence providing a framework for exploiting, in particular, IS&R in context.

Each of the four approaches presented in this chapter should contribute to the exploration of the individual group member's information behavior. These approaches

may be combined into an integrated view of the individual's problem situation and solving, taking into account both individual, social, individual-group and contextual aspects. Based on Allen (1997), we denote this as the 'group member-in-situation point of view'.

The next chapters (3-5) address the dynamic, constituting and influencing *factors* or levels of analysis that according to the research questions should be taken into account in relation to group members' information behavior: the contextual, social and personal factors. More specifically, chapter 3 addresses the concept of task based information behavior and in particular the *work task* phenomenon, constituting the contextual factor here. Chapter 4 concerns the characteristics of *group work* and groups as problem solving units, hence constituting the social factor. Finally, chapter 5 focuses on *personality* in general and in relation to information behavior, hence constituting the personal factor.

3 Work task

This chapter addresses the *contextual* dimension of information behavior, that is, the concept and attributes of task based information behavior and the *work task*, in particular.

On a continuum between a positivistic and a social-cultural approach to context (Dervin, 1997), 'work task' is here conceptualized as a carrier of meaning (the interpretative approach), but also as an analytic factor demonstrating specific characteristics that may influence the individual group member's information behavior and problem solving (objective approach). More specifically, the work task may be viewed as an abstract construction, defining a particular piece of work and/or as a concrete set of actions or elements, manifested through its performance (Byström & Hansen, 2005, p. 1051).

From this perspective it can be argued that 'the group' may act as a context to the individual by constituting a social context. However, context is here defined more narrowly in conjunction with the *problematic situation* that initiates group work and information behavior accordingly, that is, the work task. Context as a carrier of meaning in a broader sense is still acknowledged; hence, when referring to context at a general level, this broader meaning of the word is implied.

According to Byström & Hansen (2005, p.1053), a work task may be characterized as a task consisting of "…separable parts of a person's duties to her/his employer…". As this citation indicates, 'work task' often implies professional tasks in work settings as opposed to 'everyday-life tasks' and the information behavior taking place in everyday-life settings. However, we prefer, in line with Ingwersen & Järvelin, 2005, p. 283), to conceptualize work task in a broader sense as those tasks that are driven by specific goals and requirements as well as consisting of one or more subtasks. According to this conception, work task is independent of the type of setting, that is, private, academic or professional.

The first section in this chapter addresses the concept of task based information behavior, focusing on general characteristics of task in addition to the objective and subjective approaches to task and their implications for research (Byström & Hansen, 2005). Further, the nature of task complexity and its influence on information behavior is addressed.

The second section concerns the characteristics of the assignment as an example of a complex academic work task affecting information behavior accordingly (Vakkari, 2001).

The aim of the chapter is to clarify the concept of 'task' as employed in studies of information behavior and stress the complexity of the work task and its relation to information behavior, hence its importance to the study of group members' information behavior.

3.1 The concept of task based information behavior

Several attempts and approaches have been made to model and characterize 'task' and 'work task' in studies and literature of information behavior (e.g. Byström & Järvelin, 1995; Byström & Hansen, 2005; Ingwersen & Järvelin, 2005; Vakkari, 2001; 2003). According to Vakkari (2003, p. 414), tasks have been characterized either as a *process* consisting of several stages or has been treated as an *a priori condition*, left without characterization, only its context being described. For example, many information seeking studies focus on students' seeking behavior, but the goal or motivation for this behavior is often left out of the study. Thus, the point of departure is seeking, not the underlying problem or work task that initiated the seeking process. Ideally, a study should connect the task with the search process in order to analyze how they interact (Belkin, 1990).

Demonstrating a general trend, the importance of addressing 'task' in connection with studies and research on information (seeking) behavior has more recently been emphasized. A recent ASIS&T session (Byström et al., 2004), for example, was devoted to the discussion of various conceptualisations of task and their methodological implications for research. This session will be followed up in autumn 2006 by an international workshop on task-based research in educational and work settings

(NORSLIS, 2006). In a critical review, Vakkari (2003) has reviewed studies connecting task with information searching or studies which have furthered our understanding of task based information searching, highlighting at the same time the various approaches to task. Recently, Byström & Hansen (2005) have explored the conception of task resulting in a methodological framework for task in information studies. Though their focus has been on the individual task performer, they explicitly state (p. 1052) that the conceptualization underlying their framework may as well apply to studies investigating cooperative work processes. The conception of task, e.g. the distinction between work tasks and search tasks, has also been addressed by Ingwersen & Järvelin (2005) as part of their holistic and context oriented model of interactive information (seeking and retrieval) behavior.

These theoretical contributions to the conceptualization of 'task' will be further described below.

3.1.1 The task concept

Despite the fact that a holistic definitional analysis in the research field is lacking (Byström & Hansen, 2005), some general characteristics can be stated.

At a conceptual level, a task may be defined as an *activity* to be performed to accomplish a goal (Vakkari, 2003) focusing on a *particular item of work* (Byström & Hansen, 2005, p. 1051). This definition implies that a task has a recognizable beginning and end. It also indicates that a task has a goal, or an end product, which interact with, normally, a meaningful purpose. In addition, every task has requirements to fulfil that either may be conditional (must fulfil certain criteria) or unconditional (without criteria) (Vakkari, 2003). Further, it may consist of specifiable smaller sub-tasks such as information seeking or retrieval activities as well as other kind of activities that may have their own individual goals and requirements.

Tasks may also be characterized according to their degree of *authenticity* in research settings (Byström & Hansen, 2005, p. 1052). A distinction is here made between *real-life* tasks, seen as properties of different communities of practice, and *simulated* tasks,

which are tasks that may be manipulated[34]. Though the two task types have many elements in common, real-life task performance is *closely* related to its context, in contrast to simulated task performance.

3.1.2 Task approaches

In studies employing the concept of task, a task may be viewed either as an *abstract construction* or as a *concrete set of actions* (Hansen & Byström, 2005). The first view focuses on task *descriptions*, that is, *defining* a particular item of work, e.g. a project assignment. The description specifies the goal, the characteristics and the requirements of the task. The second view focuses on the task *process*, that is, *doing* a particular piece of work, implying that the task manifests itself through performance. According to Byström & Hansen(2005, p. 1051), a task may be seen as a set of physical, cognitive and/or affective actions in pursuit of a certain goal, developing and changing through time, in line with the conceptual framework underlying Kuhlthau's ISP-model.

The two views presented have also been characterized as *objective* and *subjective* approaches to task (Hansen & Byström, 2005). Due to this distinction, the former exists *external* to the performer and imposed *on* him, while the latter is seen as *internal* to the performer and defined *by* him[35].

According to Byström & Hansen (2005), an objective, descriptive approach to task may be useful in studies in which individual differences are in focus, e.g. studying how people behave under certain given conditions that may result in different types of behavior. This kind of study may call for a one-moment-in-time research strategy as opposed to data collection over time. When tasks are viewed as processes, the

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[34] Borlund (2000), for example, has investigated the use of simulated search goals associated with a simulated work task, e.g. by using a 'cover story' that describes a problematic situation that triggers and frames information needs and information searching accordingly.

[35] Allen (1996, p. 29) has suggested a similar distinction between tasks but associated with the *use of information devices*. Tasks that are accomplished by users as they meet their information needs are characterized as *external* tasks, whereas *internal* tasks are accomplished using information devices. Hence, external tasks are *device-independent*; they are general in nature and derived from the information need, the characteristics of the user, and the social environment

researchers try to recognize how people perceive their tasks, and why and how different information sources are used during task performance, hence with the aim of furthering our understanding of information-related actions. A process-oriented approach, on the contrary, calls for a longitudinal research strategy. Independent of task approach, objective or subjective, the same task may, however, be perceived differently by its performers. For example, students in a group setting, may not share the same perception of a project assignment, hence treat and approach it differently according to each group member's understanding of the task.

Though the descriptive approach to task traditionally has been applied in studies on task based information behavior, researchers generally tend to use a more process-oriented approach to task today (Byström & Hansen, 2005).

The various approaches and levels of analysis in association with the task concept are presented in Table 3.1.

Level of analysis	Element in focus	Views	Definition
Context I	Social & cultural environment/ organisation	Objective (external to performer)	Abstract construction (descriptive)
		Subjective (internal to performer)	A concrete set of actions & elements (process)
Context II	Task	Objective (external to performer)	Abstract construction (descriptive)
		Subjective (internal to performer)	A concrete set of actions & elements (process)
Situation	Sub-task	Objective (external to performer)	Abstract construction (descriptive)
		Subjective (internal to performer)	A concrete set of actions & elements (process)

TABLE 3.1. A conceptual matrix of task levels and approaches

- starting with the broader environmental context level (light grey) which continues to the task context (grey) and ending with the situational level (dark grey). (Legend in text)

Starting with the first level of analysis, *context I* represents the broader social and cultural context (the environment), in line with the holistic cognitive approach by Ingwersen & Järvelin (2005). The next level, *context II*, represents the task (e.g. a work task), which, embedded in its broader context, may be either imposed on (objective) or be defined by (subjective) the performer. Further, the task may be described either at an abstract level or be perceived as a set of actions taking place over time. As indicated by the *situation* level, each task may result in one or more situations, constituting various sub-tasks[36]. Each sub-task may again contain one or more sub-tasks. As with the task-level, these situations or sub-tasks may be viewed as either external or internal to the performer. This is also the case with the context I-level. The *double-arrow* to the left signifies the interactive nature between contexts and situations and between tasks and sub-tasks.

Applying the conceptual framework to a group-based setting, involving students preparing a project assignment, Table 3.2 shows how the analytical levels of task and situation have been replaced by concrete examples. Context I constitute the academic environment with its missions, requirements, culture, domain etc. Context II constitutes the work task, that is, the project assignment with its specific requirements etc. which results in several sub-tasks such as group work, writing, information seeking etc. In line with Table 3.2, the double-arrow signifies the interactive nature between the environment, the work task and its sub-tasks.

Context and situation is understood in the same sense as presented in section 2.1.5, hence, emphasizing the dynamic and transient nature of the situation concept, whereas the context may be seen as a more stable construct over a longer period.

[36] The conceptualization of situation and sub-task as two similar functions of 'task' is the author's interpretation. However, where a sub-task constitutes a situation, the opposite may not be the case. Rather, a situation derived from a task, e.g. a problematic situation, may constitute a condition or state in the mind of the individual, not a specific action. Moreover, other factors beside sub-tasks may constitute a 'situation', such as uncertainty, a knowledge-gab, information preferences and characteristics of the individual (Ingwersen & Järvelin, 2005, p. 279).

Level of analysis	Element in focus
Context I Environment	Academic environment (mission, culture, domain etc.)
Context II Task	The project assignment
Sub-task	Group work
Sub-task	Information seeking
Sub-task	Writing
Sub-task	Reading

TABLE 3.2. The conceptual matrix of task levels and approaches applied to a group-based setting of students preparing a project assignment. The broader environmental context level (light grey) which continues to the task context (grey) and ending with the situational level (dark grey). (Legend in text).

Though context I and II are not separated in the general holistic cognitive model, but both belong to the social, cultural and organizational context, the 'degree of contextual distance' introduced in section 2.5. may be applied to 'task' in a similar vein as the example of 'social' distance between actor, group and the broader social environment.

As Figure 3.1 of the Stratified Context-model shows, a given work task may be perceived separately from the broader context and in a shorter distance to the performer/actor, though conceptually still a part of the social, cultural and organizational context. Following from that, the view of task and situation presented by Byström & Hansen (2005)corresponds to the holistic cognitive view presented by Ingwersen & Järvelin (2005).

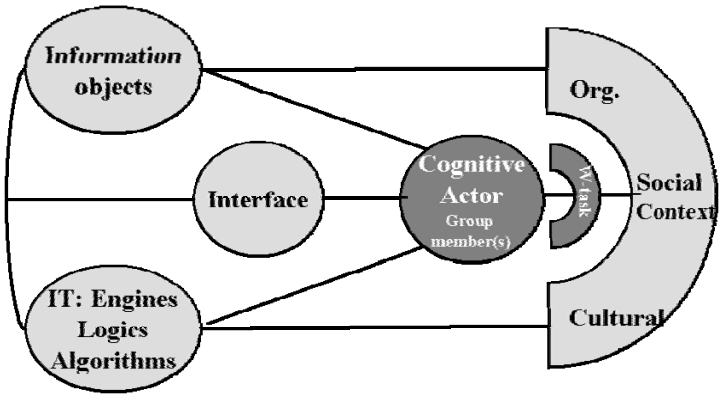

FIG. 3.1. Stratified Context-model of 'work task'.

The individual group member or the group acts as the cognitive actor, whereas the work task constitutes the nearer organizational context to that individual. (Modification of model in Ingwersen & Järvelin (2005, p. 261).

In addition to the importance of contextual (social, cultural and organisational) and situational attributes to the formation of tasks, individual attributes should also be taken into account. Apart from e.g. experience, motivation and personality traits, 'task awareness' constitutes an interesting individual attribute (Hansen & Byström, 2005). In a similar vein as 'social awareness' (addressed by Sonnenwald, 1999), it involves perception and understanding of purposes and goals of a task as well as the way the specific task is integrated into the work context. In a group setting, it is likely that 'task awareness' may take many forms due to individual differences, which emphasizes the need for exchange and negotiation of task perceptions and understandings in *group based* problem solving.

3.1.3 Task characteristics

According to the section above, tasks are imbedded in an environmental context, which affects task performance. In a work task setting, task performance is generally influenced by the characteristics of the organizational context as well as the work task itself. In the first case, the organization both limits and provides possibilities for the work task intended to be performed for the organization. The organization may, for example, set limits in terms of time, cost and other constraints and outline the standards

and levels for task performance. In the second case, various attributes of the work task have been found to affect the task performance process, such as task complexity, task structure, routine tasks, single and multiple tasks, task initiation and task performer's knowledge and experience. The multidimensionality of task performance is addressed in further detail below in relation to *task complexity* and *task performer knowledge and experience*.

3.1.3.1 Task complexity

The impact of task complexity in relation to information seeking behavior has been thoroughly investigated by Katriina Byström and Kalervo Järvelin (e.g. Byström, 1999; Byström & Järvelin, 1995; Ingwersen & Järvelin, 2005). Their findings from studies in real life work settings, for example, have indicated that there are common information related patterns of how perceived task complexity is being coped with. More specifically, their focus has been on how the task complexity dimension systematically affects information needs and seeking, e.g. how perceived task complexity affect choice of information types and sources. The analysis in their work has concentrated on the individual worker's perception from a cognitive viewpoint, but the findings may as well apply to other types of work task performers, such as students, researchers etc. In addition, not only impact from individual aspects was identified; social aspects were also identified as constraints to task performance (Byström, 1999, p. 5).

As a central point in research on task based information behavior, information related tasks can be seen as either perceived (subjective) tasks or as objective tasks. However, as pointed out by Byström & Järvelin (1995, p. 193), since each task performer may interpret the same work task differently, e.g. with regard to its complexity, the *perceived* task constitutes a relevant point of departure for exploring task complexity, affecting need formulation and behavior accordingly.

Many task characteristics have been identified in relation to perceived task complexity, such as repetitivety, analyzability, a priori determinability, the number of alternative paths of task performance, outcome novelty, number of goals and conflicting dependencies among them, uncertainties between performance and goals, number of inputs, cognitive and skill requirements as well as the time-varying conditions of task performance (Byström & Järvelin, 1995, p. 193). These characteristics may be grouped into characteristics related to the *a priori determinability* of tasks and characteristics related to the *extent of tasks*. Based on five task characteristics (repetitivety, analyzability, a priori determinability, the number of alternative paths of task performance and outcome novelty), Byström & Järvelin (1995) has developed a *uni-*

dimensional complexity categorisation of tasks according to the a priori determinability of task outcomes, process and information requirements. This categorisation is generic, hence, widely applicable on various type of tasks and domains.

According to this dimension, a *simple task* is conceptualized as a *routine* information-processing task, where the input, process and outcome can be a priori determined. At the other end of the dimension, a *complex task* is conceptualized as a new and *genuine* decision task that cannot be a priori determined. The task complexity affects the need for problem formulation and information accordingly. In routine problems, for example, no problem formulation phase exists, whereas the opposite is the case in complex problems, requiring information for problem formulation as well as for solving.

Derived from the dimension of task complexity, tasks can been classified into five complexity categories, ranging from an automatic information-processing task to a genuine decision task, as shown in Figure 3.2. As indicated by the model of task categories, the *a priori* or non-*a priori* determinability is related to the type of information needed (input), the work process (process) and the type of task result (outcome).

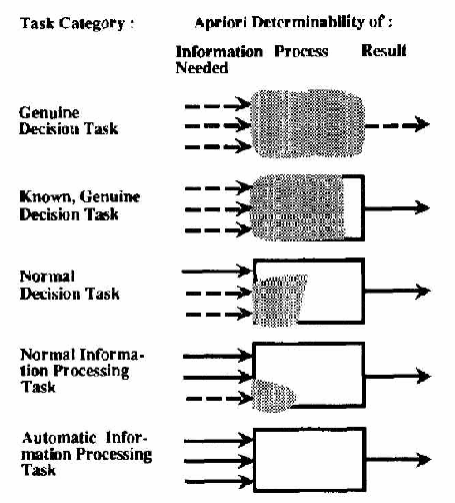

FIG. 3.2. Task complexity categories

(adapted from Byström & Järvelin, 1995, fig. 1, p. 195). Information is represented by arrows and the task process by boxes. *A priori* determinable parts of a task is indicated by solid arrows and boxes, whereas the a priori *in*determinable parts of a task are indicated by dashed arrows and boxes. The three arrows at the input-side indicate that many input are often needed and that there are degrees of a priori determinability among them.

Automatic information processing tasks are a priori completely determinable and suited for automatisation. *Normal information processing* tasks are almost completely *a priori* determinable, requiring still some case-based arbitration. *Normal decision* tasks are quite structured with elements of case-based arbitration. *Known genuine decision* tasks are based on a priori known type and structure of result, while the task procedures are unknown. This makes the process and the required information less determinable. *Genuine decision* tasks are unexpected, new and unstructured. Hence, neither the result, nor the information requirements can be characterized in advance.

This conceptualization of task complexity was investigated by Byström and Järvelin (1995) in a real-life setting, a city secretarial office in Finland. Based on the qualitative results, the effects of task complexity on information seeking was found to be systematically and logic (p. 211). As task complexity increased, so did the complexity of the information needed, the needs for domain and problem solving information, the number of sources used as well as the share of general-purpose sources. At the same time, the use of problem and fact-oriented sources, the success of information seeking and the internality of information channels decreased. In addition, though not explicitly addressed, affective reactions were found to relate to task performance as well. For example, dead ends in tasks led to many information seeking actions with probably anxiety. At the same time, a change of level of ambition and type of information needed in task reflected a gain in the performer's confidence. Due to the differences between simple and complex tasks and the result from the study it was hypothesized that the affective dimension is often not as marked in simple tasks as in complex tasks. Feelings like lack of motivation, anxiety etc. may have an overall effect on performance. In simple tasks, however, they did not form an integral part of the process itself. Rather, feelings in simple tasks, e.g. anxiety, were likely to arise solely due to *situational* factors[37].

The conceptualization of task complexity presented here may apply to sub-tasks as well, such as information seeking and searching. However, seeking and search task

[37] Situational factors may also affect emotionally in complex tasks, but *in addition* to the feelings arising from the work task process itself.

complexity may vary *irrespectively* of the work task complexity. For example, a complex work task may involve a routine search task. The perception, and independence, of task and sub-task complexity is also associated with performer knowledge and experience. According to Ingwersen & Järvelin (2005, p. 289), a perceived complexity is both an emotional and cognitive individual phenomenon, depending on and influenced by the knowledge and experience of a given actor in context. A novice and an expert, for example, may perceive task complexity quite differently according to their prior knowledge or experience. This is further addressed in the next section.

3.1.4 Task performer knowledge and experience

The knowledge (and experience) necessary in task performance relates to three types of knowledge (Byström & Järvelin, 1995):
Problem knowledge, specifying the problem at hand; *domain knowledge*, e.g. facts and knowledge of the domain or subject field within which the problem belongs and *problem solving knowledge information*, e.g. the methods and heuristics for problem solving or task performance in the specific domain. This knowledge may also be divided into *declarative knowledge* (to know-what), denoting the performer's conceptual knowledge and *procedural knowledge* (to know-how), denoting the performer's knowledge of how to plan, structure and perform the task as well as the performer's individual experience. These knowledge types may be relevant independently of task level, that is task or sub-task level. To give an example that relates to a group setting of students preparing an assignment, declarative and procedural knowledge is relevant both at the task level regarding the assignment *and* at the sub-task level(s) regarding information seeking and group work. The knowledge associated with group work is addressed in more detail in chapter 4. What information seeking is concerned, Ingwersen & Järvelin (2005, p. 285) have proposed a framework in which they distinguish between six knowledge types according to type of task (work task or search task) and the declarative and procedural features associated with each type of task. The six knowledge types are shown in Table 3.3: 1) work task knowledge, 2) problem and task solving knowledge, 3) information source and system knowledge, 4) search task solving knowledge, 5) person and group knowledge and 6) social interaction skills.

Perception of Task type ⇨ ⇩	Declarative features of task	Procedural features of task
Work task (work, daily-life, interest)	Work task content (K1)	Problem & work task solving (K2)
Search task – Interactive IS&R	Information source (K3)	Search task solving (K4)
Search task – inter personal communication	Personal & group (K5)	Social interaction skills (K6)

TABLE 3.3. Table of knowledge types and skills
according to type of task and the declarative and procedural features associated with each type.
K=knowledge. (Adapted from Ingwersen & Järvelin, 2005, p. 285).

The two last knowledge categories (5 & 6) are new compared to earlier models of relevant knowledge types and skills (e.g. Ingwersen, 1992, p.142). They are especially relevant to the present work by explicitly stating the importance of also person and group related knowledge for problem solving. *Person and group knowledge* signifies acquaintance of and expectations of other people or teams as reliable information sources. In addition, it involves declarative knowledge on communication channels, formal as well as informal. *Social interaction skills* imply knowledge of social communication conventions, behavior, procedures and codes, e.g. in socio-cultural, daily-life and organizational environments, and how to operate the communication channels.
In all types of knowledge, emotional reactions may occur dependent on the performer's level of knowledge and experience. For example, novice performers, such as group members, lacking knowledge and experience in how to solve the task at hand, to search for information and interact socially and communicate may respond with perceived uncertainty and confusion, whereas experts in the same categories may not.
This was, for example, demonstrated in Kuhlthau's (2004) study of the ISP of lawyers and the securities analyst.

This extension of knowledge types derived from the holistic and context oriented approach to interactive information (seeking) behavior is in line with Wilson's (1999) conceptual model taking into account the environmental, social and personal dimensions of information behavior. It offers a nuanced conceptualization of the various

knowledge types involved in interaction, e.g. in a group based setting – that may help explain and understand the complexity of information seeking.

3.1.5 Task performance

Task performance at a general level may be divided into three main parts (which again may be divided into smaller parts): task construction, task performance and task completion (Byström, 1997).

Task construction has its focus on a conceptual level, involving the comprehension and understanding of preconditions and goals for performance and completion of a given task, e.g. associated with an assignment. This part of the process may be perceived as a rather difficult part by the performer affecting his/her behavior accordingly (Kuhlthau, 2004). According to Byström & Hansen (2005)the impact of the construction phase seems to be less critical in professional work, where people generally are more confident in their judgements in this phase. This part of task performance is in general internal to the performer, hence difficult to observe directly.

The second main part of tasks focuses on *actual performance*, consisting of practical and conceptual actions taken in order to achieve the goals. These practical actions may be directly observable.

The third main part of task performance focuses on *task completion*, which constitutes the joining of separate results of actions into a task resolution, and eventually, the task is completed. In some tasks, the task is completed when the performer arrives at a satisfactory result either directly or after the completed efforts. In other cases, a satisfactory result is not obtained, e.g. additional efforts are undertaken or the task is not completed. With regard to tasks having a recognizable start and end there may not necessarily be a congruence between the logical end of the task and the performer's *perceived* experience of closure. For example, in a study of students' task based information behavior which was based on the ISP-model, Vakkari (2001, p. 51) found that though logically being at the presentation stage, half of the students had not been able to construct a focus but were still involved in constructing it. Thus, the problem was not sufficiently clear for all of them although they had finished the research proposal (Vakkari & Hakala, 2000, p. 549).

The determination as well as the reasoning leading to perceived task completion may be difficult to observe directly; it may, however, be communicated.

3.2 The assignment

This section focuses on the assignment as an example of an *academic* work task. It may take many forms, such as the project assignment, the school assignment or the research proposal. In many studies on information behavior, the assignment constitutes the work task, either as an a priori condition or as a process consisting of several stages (e.g. Kracker & Wang, 2002; Kuhlthau, 2004; Limberg, 1998; Onwuegbuzie, 1997; Vakkari, 2001).

The assignment is an example of a real-life work task being performed by students, either individually or in groups and being closely related to its context, that is, the academic environment, domain, culture etc. In addition, it is characterized by having a clear goal and purpose (e.g. to graduate) as well as a clear start and end due to formal requirements. In addition, it is also an example of a *complex* work task, demonstrating many of the characteristics mentioned by Byström & Järvelin (1995). From a problem solving point of view, *understanding*, *sense-making* and *problem formulation* are essential to complex tasks, requiring different types of information.

As shown earlier in Table 3.2, the assignment may contain many sub-tasks, such as information seeking, writing, reading and group work, if performed in a group based setting.

The study approach follows the general picture conceptualized in Table 3.1, meaning that the assignment may be addressed at a descriptive level (objective approach) or at a process level (subjective approach) according to which individual perceptions and experiences of the work task over time become important.

In line with the growing interest in integrating the ‘task’ in studies of information behavior, researchers have started exploring how task and information (seeking and searching) behavior interact. The next section presents a study by Pertti Vakkari, exploring Kuhlthau’s ISP-model in association with stages of the work task, a research proposal. This study has already been mentioned as part of the discussion of the ISP-model. The focus here, however, will be on the work task *characteristics* and the study’s contribution to further our understanding of task based information behavior.

3.2.1 Vakkari's study of work task performance and the ISP

The role of the work task in information seeking has been explored by Vakkari (2001)[38] in a longitudinal study of 11 master students preparing a research proposal for a master's thesis. The aim of the study that was based on the ISP-model, was to investigate how the *stages* of task performance, that is, the students' problem stages in writing a research proposal, were related to the information search behavior described in the ISP-model. Search behavior was defined as the information types searched for, choice of search strategies and relevance judgements made, which were primarily associated with information retrieval (IR). Due to methodological reasons, Vakkari (2001, p. 48) has concentrated on the stages before and after focus formulation, constituting the most crucial phase in the process. Hence, the six original stages of Kuhlthau's model have been condensed into three in Vakkari's study. The *pre-focus* stage included the steps of initiation, selection and exploration; *focus formulation* was identical to Kuhlthau's model and the *post-focus* stage included the collection and presentation stages[39].

Based on a qualitative study approach, various methods were applied, such as think-aloud-search sessions, search log, diaries an interviews at three selected points in the research process: at start, in the middle and when the students were finishing or had completed their proposal.

The study showed that there is a close connection between the students' problem stages in task performance and the information sought, the search tactics used and the assessment of relevance and utility of the information found. Though not addressed explicitly in the thesis, the task effects should be mentioned briefly to demonstrate the variations in search behavior due to task factors.

For example, as the students' understanding of the task grew and got more focused, more specific search terms and more varied operators were used as well as more search tactics. In addition, more synonyms were used as their knowledge of the topic

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[38] Vakkari (2001) reports a study that has been further described in four articles (Vakkari, 2000a; 2000b; Vakkari & Hakala, 2000; Vakkari & Pennanen, 2000)

[39] Vakkari's three stages correspond to a large extent to the three general task performance levels proposed by Byström (1997): task construction, task performance and task completion.

increased. Not surprisingly, the increase in domain knowledge enhanced he students' ability to express search terms and formulate tactics. The lesser they knew, the fewer, broader and more vague terms they used and the shorter queries they formulated. What choice and relevance of information sources (references and full text) is concerned, relevance criteria changed according to the specific problem stage in task performance. The most crucial relevance factor was topicality in each stage of the process. However, type of document mattered during the process, though more important in the beginning of the process than towards the end. For example, references to general background and theoretical information were primarily chosen during the pre-focus stages. At the post-focus stages, references to methodological sources were preferred. Hence, the type and character of information searched for and used changed depending on the stage of the task. This also confirms the dynamic nature of information needs, here as a function of task performance and cognitive experience.

The main result of the study demonstrated that the work task stages derived from the ISP-model, and thus, the increasing differentiation of the students' cognitive structures had a *systematic* impact on their search behavior in the task performance process[40].

3.3 Summary

This chapter has addressed contextual aspects associated with task based information behavior and the work task in particular.

The concept of 'task' has been conceptualized as a set of *physical*, *cognitive* and/or *affective actions* in pursuit of a certain goal, developing and changing through time, in line with the conceptual framework underlying Kuhlthau's ISP-model. Tasks may be addressed at various levels of analysis, involving a contextual, a work task and a sub-task level. Where the former frames the work task, the latter is derived from the work task, e.g. demonstrated in sub-tasks such as information seeking and group work.

[40] The findings in Vakkari's study have been used to formulate a theory of the IR process in task performance that refines the sub-task stages in the ISP-model. This is, however, outside the scope of the present research focus and has not been taken further into account.

Various task characteristics have been presented, emphasizing the importance of task complexity in relation to task based information behavior. Depending on the *perceived* degree of complexity associated with various types of tasks – or sub-tasks -, task performance such as task construction, task performance and task completion, may result in different forms of information seeking and search behavior. This is, however, also related to the *prior* knowledge and experience of the performer, independent of the level of task performance, work task or sub-task level. Six knowledge types possessing declarative or procedural attributes have been proposed as relevant in relation to work and search tasks.

With relevance to the present thesis, the assignment has been addressed as an example of an academic and complex work task, demonstrating specific characteristics over the professional and everyday-life work task, e.g. with regard to task performers, performance and formal requirements.

Based on the work by Byström & Järvelin (1995); Byström & Hansen (2005)and Vakkari (2001), task performance can be seen as a *dynamic* construct influencing information seeking behavior according to its point in the task process. Expressed in another way, understanding information seeking behavior cannot be separated from the work task process.

However, the work task only constitutes one of many factors affecting the dynamics and diversity of information seeking and retrieval activities imbedded in work tasks. Also effects from social and cultural factors have been acknowledged (e.g. Byström & Hansen, 2005, p. 1058) and pointed out as relevant to research in order to understand the development of contextual preconceptions for task performance processes. Hence, group work constituting a social factor may as well affect work task performance and information behavior.

Focusing on *group based* task performance and problem solving, the next chapter addresses the *social* dimension of information behavior imbedded in work tasks, such as the assignment.

4 Group work

This chapter addresses the *social* dimension of information behavior, that is, the group and social-cognitive processes and interactions implied by problem solving in groups (group work) that may affect group members' information behavior in terms of activities, cognitive and affective experiences.
A large body of literature and research exists on the social dimension of human life, involving a large number of aspects related to sociality. In this chapter, the focus is on *groups* where people act as group members and are required to cooperate. In addition, aspects associated with problem solving at the *group level* will be addressed, as opposed to the individual problem solving aspects addressed under the cognitive viewpoint.

The first section addresses the group phenomenon, that is, the characteristics of primary groups acting as units towards a shared goal. The next section addresses the concept of groups as problem solving units, and the collaborative intellectual processes involved by group work. The third section addresses the characteristics of acting as a group member, differentiating the collective mind represented in a group from the individual mind. The last section presents characteristics of group work in an academic setting based on the work by Limberg (1998), which has brought insight into the relation between information behavior, problem solving and group work.

Some of the central processes associated with group work are *cooperation* and *collaboration*. According to Tuomela & Tuomela (2005), 'cooperation' can be defined as a complex notion implying collective and intentional action towards a *shared goal*. 'Collaboration' on the other hand implies the working together, especially in a *joint intellectual effort*. Depending on the context, these terms will be used interchangeable.

Literature and research on teams and teamwork generally refers to work groups in organizations and companies. However, concerning the characteristics of teams and team behavior, the theoretical and empirical findings may as well contribute to the understanding of group work in academic settings. Hence, the literature on teamwork will be applied if relevant to understand the characteristics of group work.

The aim of the chapter is to point to the characteristics of group work and the constraints that may follow from group work in relation to information behavior.

4.1 Group characteristics

This section is primarily based on the work by Susan T. Fiske (Fiske, 2004) on social psychology and the work by Gerard M. Blair (Blair, 1991) on teams and project management.

4.1.1 Conceptualization of 'group'

Social psychologists converge on three approaches to defining a group (Fiske, 2004). Some view a group as comprising of individuals whose combined behavior simply summates into a group phenomenon. Others consider a group to have unique properties that go beyond merely interpersonal processes, e.g. by developing a social identity. Still others abandon the effort at definition.

The conceptualization of 'group' as applied in this context is based on Schein (1980) according to whom a group can be defined as a number of people who i) interact with one another ii) are psychologically aware of one another and iii) perceive themselves to be a group. In addition, the group type in focus may be characterized as a *primary* group as opposed to secondary groups or reference groups[41].

According to social psychologists (e.g. Blackler & Shimmin, 1984) primary groups can be described as:

- involving regular contact between members of the group, including direct face-to-face interaction (modern technology has decreased the latter requirement)
- fairly small (up to 20 members)
- involving co-operation

[41] Reference groups are groups that people compare to, which are not their own membership groups (Fiske, 2004). In addition, these groups do not possess the characteristics of the primary group (Shein, 1980). This is a more restricted meaning of the word compared to Wilson's employment of the word as referring to those in the world of work "…with which the user identifies…" (Wilson, 1981, p. 6).

- sharing common goals
- knowing who all the members of the group are
- having a rough idea of what other people's roles are in the group

Further, groups have unique, emergent properties that differentiate them from a mere aggregate of individuals on three accounts, that is entitativity[42], perceived volition and actual behavior (Fiske, 2004). Groups may also perform better than individuals, depending among others on the group size. In a recent study of the effect of group size on problem solving, Laughlin et al. (2006) demonstrated that three group members were necessary and sufficient for the participating groups to perform better than the best of an equivalent number of independent individuals. Groups of two people performed at the same level as individuals working alone, while groups of three, four, and five people performed significantly, but *equally* better than an equivalent number of 'best individual' and two-person groups.

Basically, groups form a unit of work activity. When people work in groups there are two quite separate issues involved (Blair, 1991). The first is the *work task* and the associated problems to be solved. The second is the *process*es of group work itself – the mechanisms by which the group act as a unit. Without attention to this process, the value of the group can be diminished or even destroyed.

Focusing on the social psychology of a group, three main motives for participating in group interaction have formed the core of small group research, which are belonging, understanding and controlling (Fiske, 2004).
Belonging refers to social identity and the need to belong, hence identification with the group becomes important. In groups with a strong need for social identity, deviant in-group members may be perceived as a threat and rejected by other group members.

[42] Entitativity entails being perceived as a coherent whole, based on similarity, common fate, and perhaps proximity. These factors in addition to ongoing social interaction encourage cohesion and social integration and foster among the individuals a sense of group membership. Essentially, cohesion results in developing a shared understanding of their situation and an emotional bond with each other.

Understanding refers to the need for obtaining a socially shared understanding that also is associated with uncertainty reduction. When people identify with a group, they *depersonalize*, that is, become less oriented to their individual identity, while orienting more toward being a prototypic member of the group. 'Assimilating self' to the group's prescriptive prototype, that is, the group ideal, reduces feelings of uncertainty by providing guides for *thoughts*, *feelings* and *actions*.

Moreover, the group consensus validates individual group member's reactions when they *assimilate* to the group prototype. Hence, the group may provide an environment where the individual's self-perceived level of responsibility and authority is enhanced. As a motivating factor this may result in enhanced self-esteem coupled with low stress (Blair, 1991). In turn, when a sense of shared social understanding *fails,* people become uncomfortable (Fiske, 2004). People may become irrationally distrustful and suspicious, when they do not share the group's understanding, e.g. resulting from being new or different. These situational uncertainties can make people hyper vigilant and ruminate, which together lead to perceived personal insults or evil intent. These emotional reactions often occur at *early stages* in group formation, as addressed in the next section. 'Uncertainty' is further addressed in section 4.3.3 in relation to group member behavior and interpersonal relations.

Finally, *controlling* refers to the need for control in groups, being composed of people who are interdependent, sharing a common goal and whose outcomes depend on each other. Some people and situations elicit a strong need for control. When people are dispositionally or situationally high in need for closure, the group becomes more business-like. Interaction focuses toward the work task at hand and away from positively social interactions that do not directly advance the task. Giving and requesting suggestions, directions or plans illustrate behaviors that reflect mutual control over each other and the group's outcomes.

Apart from the properties mentioned above, groups are in general more competitative than individuals. Fear of losing control over one's outcomes and greed to enhance self, also contribute to group competitiveness (Fiske, 2004).

4.1.2 Group development

How do a variety of members, varying in identity and group attraction, become members of a group? According to Fiske (2004), joining a group is a *process*, not a single outcome. Groups are generally viewed as developing through four stages,

irrespective of the group has been formed on a ‘freely’ or on a conditional basis: *forming*, *storming*, *norming* and *performing* (Blair, 1991).
Forming is the stage when the group first come together. Everybody is polite and very dull, and conflict is seldom voiced directly; it is mainly personal and destructive. Since, the grouping is new, the individuals will be guarded in their own opinions and generally be reserved. This is particularly so in terms of the more nervous and/or subordinate members who may never recover. Further, the group tend to defer to dominating individuals in the group.
Storming is the stage where factions are formed, personalities clashes and conflicts are dominating. Only little communication is taking place.
Norming is the stage where groups begin to recognize the merits of working together and subside the in-fights. From the new spirit of co-operation, each group member begins to feel secure in expressing their own viewpoints and these are discussed more openly with the whole group. People start to listen to each other and work methods are established and recognized by the group as a whole.
Finally, *performing* refers to the stage when the group has settled on a system or norm, which allows for free and frank exchange of views and a high degree of support by the group for each other and its own decisions.

In addition to these stages of group development, various *sub-functions* may contribute to the development as well. According to Blair (1991), the focus should be on the group and the work task - not on the individual -, and the goal of the group should be clarified. Moreover, room should be made for both the quiet and the loud-speaking individual, and communication and feedback should concern the work task, not the personality of the individual.

A group of people working on a common project may, however, not invoke the group process. If the group, for example, is managed in a total autocratic manner, there may be little opportunity for interaction relating to the work. Further, if there is a fractioning within the group, the process may never evolve. In other words, the group process should lead to a spirit of cooperation, coordination and commonly understood procedures and mores. Then performance is enhanced by their mutual support, practically and morally.

4.1.3 Group skills

The group process consists of a series of changes, which occur as a group of individuals form into a cohesive and effective operating unit. In addition to the *cognitive* skills required to solve the work task or problem at hand, the group process also requires *managerial* and *social* (interpersonal) skills to be acquired (Blair, 1991). As an self-administrating unit, the group must, for example, *collectively* undertake and learn many of the functions similar to group leaders, that is, organizing meetings, strategic planning, goal setting, performance monitoring and schedule reviewing. Moreover, the group must relearn some basic manners and people-management skills in order to stimulate the group process positively.

4.2 Groups as problem solving units

In this section, the focus will be on groups as problem solving units, addressing in particular the cognitive and social motives and processes involved in problem solving at the *group* level.

4.2.1 Cognitive and social motivation in group problem solving

In contrast to individual problem solving, problem solving in groups involves an interplay of two motivations: the *cognitive* motivation to produce an optimal group product and the *social* motivation to act in union with other group members and come to a solution acceptable to all members of the group (Kaplan & Wilke, 2001). The former is driven largely by concerns for accurate and useful *work task-relevant solutions*, whereas the latter is driven by *group-centred needs* to maintain relationships and identity by achieving mutually satisfying solutions. In this way, groups must deal with the task and its cognitive demands, but also with intragroup relationships and their implications for social rewards, member welfare and social identity.

Various conditions produce cognitive (work task oriented) and social (relationship oriented) motives, which again may impact on group processes and productivity. Concerning cognitive groups, they will be motivated by seeking, evaluating and reasoning systematically about relevant information. Social motives, on the other hand, may be more diverse, e.g. expressed in a need for maintaining cohesion and harmony. Thus, an important social motive in within-group influence is to maintain a social

identity by finding *common ground* with the group on decision issues. Interpersonal behavior in everyday life is, however, governed by both the social-emotional need to belong, and the cognitive need to understand, predict and control one's world (Nezlek, 2001).

Cognitive and social motives may conflict in groups, but may also interact in the sense of affecting one another positively. Uncertainty of reality, for example, may be reduced due to group membership, and social interaction may lead to socially shared cognition.

Any conditions that engage cognitive motives should result in decision processes that reflect informational influence, defined as influence to accept information from others as evidence about reality. This implies a cognitive strategy that will be instrumental for accuracy demands in work task. In turn, conditions that induce social motives should enhance the use and effectiveness of normative influence, referring to influence conforming to the expectations of others. This strategy will involve seeking and considering the preferences of others, which is instrumental to meeting the social motive of finding the most satisfying solution by reaching convergence of preferences.

The most salient factor that focuses the group on either cognitive or social concerns is the *type of decision* facing the group. All *group tasks* may be described on a dimension running from *intellective* tasks, which have a demonstrably correct solution within a consensual conceptual system, to *judgemental* tasks for which solutions are based mainly on social consensus. The latter include behavioral, ethical and aesthetic judgements that are matters of preference rather than demonstrably facts. Hence, informational influence will be more relevant to intellective tasks whereas normative influence will be more useful to judgemental tasks.

Group tasks may also differ in their effective means used to reach a group solution (Kaplan & Wilke, 2001). For *additive* tasks, individual contributions are added together - like in the 'pulling a robe'-case. For *disjunctive* tasks, such as physical or intellectual tasks involving either-or-answers, the most able group member provides the task solution due to his/her efforts and abilities. Finally, in *conjunctive* tasks, such as climbing a mountain as a group, the group performance is dependent on the least able member. The extent to which one's task efforts will be effective or needed in order to achieve, the required group product will be more salient in disjunctive tasks. The extent to which one is focused on matching the efforts of one's fellow group members will, in contrast, be more salient in additive tasks.

Due to the task or interpersonal interdependence, groups may focus to varying extents on *effectance* or *fairness* considerations. For effectance, information about the task is most salient, whereas for fairness, the performance of other group members' functions as a normative anchor is most salient, stressing again the importance of the cognitive and social motivations invoked by the nature of the task (intellective vs. judgemental).

Task characteristics may also affect how information is shared in groups. Stasser & Stewart (1992) have suggested that the way group members perceive the task affects the pattern of communication of shared and unshared information. Group members, for example, introduce more unshared information if they are told that the task have a correct solution, than if they believe that preferences and values (judge set) are involved. Hence, if members believe that there is a correct answer, informational influence prevails, whereas normative processes are dominant if group members believe that there is no correct solution.

As stated above, both *cognitive* and *social* motivations influence and determine group member behavior, that is, the characteristics of the underlying need, goal and task, based on either effectance or fairness considerations.

The next section focuses on the cognitive processes in groups, which implies many sub-functions that correspond to the problem solving functions addressed in LIS - in so far as information processing in social psychology is not limited to the individual's cognitive structures only, but may also involve the processes and interactions *outside* the individual. In contrast to LIS, the cognitive processes and sub functions within social psychology are investigated from a *group-level* of analysis, which have resulted in research that have contributed to the understanding of the social impact on group based problem solving, which is in focus here.
The term 'cognitive cooperative processes' will be used to distinguish the cognitive processes in groups from the cognitive processes of the individual.

4.2.2 Cognitive cooperative forms and processes in group problem solving

The underlying rationale of having people work in groups is that groups in most cases do better than individuals. According to McNeese (2000), socio-cognitive factors help team members make sense of a situation, converge multiple perspectives towards a

solution and transfer knowledge from one context to another. Further, cognitive benefits accrue when individual team members share knowledge through cooperative processes.

Three *forms* of cognitive strategies have been identified that form the basis for cooperative cognitive processes: 'collective induction', 'generative learning' and 'metacognition' (McNeese, 2000).

Collective induction refers to the group-cognitive process that reinforces synergistic interaction among group members such that ideas, knowledge and strategies are disseminated to each member. Collective induction may also be viewed as a form of *generative learning* as members engage in active discussions and explanation rather than just passively receiving information, also described as the social construction of knowledge resulting in group sense making (Weick, 1995). Dominant group members[43] may, however, affect the process of collective induction negatively. *Meta-cognitive strategies* allow people to plan and assess their own cognitive behavior and, further, facilitate successful problem solving. Based on a study by McNeese (2000) that investigated the difference in behavior between individuals and groups, it was found that the groups engaged in collective induction and metacognitive strategies, and generally approached the problem at hand differently from the individuals. The individuals were more inclined to focus on details and spend time exploring the perceptually based macro-context compared to the 'shared' groups (groups with no dominant group member). In contrast, these groups tended to demonstrate a *distributive* approach to problem solving, focusing on metacognitive strategies to come to a solution. This derived from *external* group memory, which turned out to reduce the necessity of exploring the macro context in order to retrieve the required problem solving data. Individuals, on the other hand, had more perceptual learning experiences and maintained a stricter use of problem details as cognitive tools.

According to this study, groups may rely on each other for a kind of externalized transactive memory system rather than searching for information. This *distributed intelligence* facilitates more collective induction and meta-cognition, but also reduces group members' exposure in the context.

[43] A dominant member is defined as the one who talks the most during learning activities.

Another aspect of the distributed component is the less necessity for each team member to address *every* aspect of a problem. Teamwork may, for example, be shared or stratified according to situational needs, roles, goals, abilities and interdependencies of the group, that is, one group member may solve one component while another group member may address a different component. This is also conceptualized as teamwork being partially and loosely coupled, which implies that any member may construct different knowledge, hence distributed to the other members as part of the *collective* solution outcome. Individuals, on the other hand, do not have this luxury of relying on other members for knowledge and memory of details or of localizing their efforts for a particular component of the problem. They must generate everything on their own, take personal responsibility for every aspect of the entire problem and use the macro context to access information/details of the problem.

The *cooperative cognitive processes* that guide group problem solving are problem identification and conceptualization, information acquiring, storing, retrieving, distributing and sharing as well as manipulation and use of information (Akgün, 2006; Larson & Christensen, 1993). Depending on the problem situation, some or all of them may be activated. Further, these sub-processes (or sub-tasks) may be activated in any specific order to solve the problem at hand. Certain functions, however, such as problem identification and conceptualization, precede other functions by nature, but they may also be returned to later in the process if the initial efforts to fulfill those functions had been incomplete.

The starting point of all problem solving, whether on an individual or group level, is the initial identification of the problem. It is useful for the purposes of exposition to differentiate between problem identification (to recognize that a problem exists) and problem conceptualization (to understand what the problem is about).
In a group setting, problem *identification* requires that at least one group member has identified the problem. However, to be deemed identified by the group, all members need to become aware of the problem and perceive the problem. Until then, no meaningful and interactive problem-solving activity can take place - only independent, individual-level problem solving will be possible. Thus, group–level problem identification requires *more* than just individual cognition. It also requires that group members *communicate* their perception to the others that a problem exists – the first essential step in social cognition. However, group characteristics may influence the

communication of problems identified by one member to the others. Groups, for example, that place a high value on continued performance improvement may emphasize the utility of problem identification and joint problem solving. Such groups are likely to establish norms that encourage members to be alert for potential problems. In turn, groups that place a high value on interpersonal harmony and cohesiveness may emphasize the negative consequences (e.g. conflict) that can sometimes occur during group problem solving. These groups may establish norms that actually *discourage* individuals from bringing problems to the attention of others.

The group members' *conceptualization* of the problem provides the foundation upon which all subsequent problem-solving activity is built, though this activity itself may alter how the problem is conceptualized and consequently change the perceived relevance of various kinds of information or solutions. Each member generates his/her own conception of the problem that may be either similar to the other members or differ, often depending on whether the group members have common background experiences. A unified conceptualization may ease the employment of various problem-solving strategies, while the existence of multiple-problem conceptualizations as a uniquely group-level phenomenon may both have advantages and disadvantages for the group. When different members have different conceptualizations of the problem, the probability is increased that the group as a whole has within its midst an appropriate conceptualization, e.g. one that makes it possible for the group to find a solution that will be acceptable to individuals inside the group. It may also imply that different group members will have quite different ideas about the potential relevance of various kinds of information and solutions – which in turn makes it more difficult for the group to coordinate its information gathering and problem solving activities. Thus, an important function for the group is the *discovery* and *resolution* of *differences* in how group members conceptualize the problem at hand. A variety of actions may be taken, such as freely sharing ones conception to identify discrepancies across group members or by trying to 'sell' or persuade the others to take ones conceptualization. In cases with ambiguous problem situations, groups are likely to adopt problem definitions that are consistent with available solutions. In addition to resolving differences in perceptions, group discussion may also serve as the medium through which problems are conceptualized in the first place.

As mentioned earlier, problem conceptualization may change at later stages of the problem solving process, e.g. when new information is introduced into the group – in

line with Kuhlthau's ISP-model (1991; 2004) – or when there is a turnover in group membership. In addition, as they work towards a problem solution, groups may pass important milestones that prompt them to rethink the fundamental nature of the problem (Gersick, 1988).

When the problem has been conceptualized, problem relevant information needs to be acquired before coming up with a workable solution. As with individuals, groups must also cope with the reality of limited cognitive resources – of social as well as individual variety. When the information needed to solve the problem is not present in the group's immediate environment, the group must decide what is needed and e.g. which group members should be responsible for obtaining it.

Concerning the assessment of *information needs* in groups, it seems that the degree to which a problem is structured and familiar will have an impact on the process (Larson & Christensen, 1993). This is in line with studies in information science on the relation between task complexity and information behavior (e.g. Byström & Järvelin, 1995) as presented in chapter 3.

Well-structured problems, for example, may allow groups to assess their information needs before any information is actually collected, whereas poorly structured problems may require that the assessment of information needs to be an ongoing affair. Hence, the overall problem-solving process for poorly structured problems is likely to be more cyclic than linear, with groups revisiting the information acquisition stage again and again until enough of the right types of information have been obtained. With regard to considering which group members should obtain information, the abilities, motivations and experiences of group members are stressed (Wegner, Guiliano & Hertel, 1985). Further, the number of group members that should be assigned to an information acquisition task has been found worth considering. By having different members acquiring different types of information, e.g. in situations when the group has to cope with larger information loads, *distributed information acquisition* is an effective way to obtain information. However, there may be situations when *collaborative information acquisition* should be preferred to distributed acquisition. Information can sometimes be obtained more reliable when several people attend to it; the mix of skills needed to obtain the information may be beyond the capacity of any single group member. In addition, the process of collaborative information acquisition may as well serve the generation of a *collective* representation of the problem at hand, hence guiding the problem solving strategies accordingly. According to Larson & Christensen (1993), the

collaborative acquisition form is more likely to occur in ill-structured (or complex) problem solving situations. To the extent that multiple group members have the background and experience necessary to obtain various sorts of problem-relevant information, those members can assist one another when unexpected difficulties arise.

Another function relevant to problem solving is *storing* of information in memory. At the group level of analysis, memory is regarded as distributed across individuals like an information network. In addition, the way this information is distributed within a group may also affect the group's joint problem solving. Two elements are relevant to consider: 1) the number of group members who have access to a given piece of information and 2) whether that access is direct or indirectly.

Prior to discussion in a group, a given item of problem-relevant information may be held by either a single member or by multiple group members. According to Stasser & Titus (1987), this distinction may also be expressed by referring to *shared* when information is held by more than one member, and *unshared* if one single member only holds it. By 'held' means that the information can be stored either in memory or available in an external store, e.g. a notebook or an electronic information system, in so far as this information can be retrieved during a problem-solving discussion. In this context, the number of group members that are involved in acquiring the information plays a role. Independent of whether the information is shared or unshared prior to a general group discussion, there are a number of ways that information can be converted to shared information. The person holding the information may, for example, informally convey his/her findings to one or more members of the group before the group as a whole meets. Or he may prepare a document reporting the information and circulate it to the rest of the group (e.g. by email) or put the information into a formal repository or an information system to which all members have accesses. The distribution of problem-relevant information within a group often comprises a mix of shared and unshared information (Larson & Christensen, 1993). In the context of access, a group member may have *direct* access to problem-solving information, that is, information stored in memory (or in an information system), or indirect access when he/she cannot recover the information personally, but have to elicit it from someone else in the group. In the latter case, *meta-knowledge* also become important, that is, to know and make inferences from clues such as who may know what in a group. One such clue may be to know that a group member has read a specific book. Then you may infer that he or she possesses a specific item of information. In this way meta-knowledge helps group

members understand how information is distributed within the group; hence the generation of meta-knowledge in addition to information acquisition is important to problem solving. In this context, discussions serve as a tool by which group members can drive problem-solving information out of one another. Once an item of information is introduced into a problem-solving discussion, it becomes directly accessible to everyone in the group, hence, can be used in collaborative problem solving. Though much of what goes on during group discussions is actually cognition at the individual level, social cognition does not disappear once all problem-relevant information is in the open. Rather, it is during *group discussions* that social cognition is activated.
According to Sniezek & Henry (1990), the social interactions that take place during group discussions serve three distinct functions; 1) problem-relevant information is brought to light, 2) it functions as a mean of influencing cognitive processes at the individual level, that is, group members may affect one another's perceptions, judgments and opinions, and finally 3) social interaction also serves as the vehicle by which group members' perceptions, judgments and opinions are combined in order to generate a single group solution. This may, however, be constrained by 'social decision schemes' associated with *majority* or *minority* representations in the group, which is further addressed in section 4.3.

With a focus on *team intelligence* and the dimensions of information behavior in new product development, Akgün, Lynn & Yilmaz (2006) have explored various cognitive sub-processes involved in generating team intelligence to effectively solve problems in teams. By 'team intelligence' is meant, "…the functional intelligence of a group of people working as a unit, …[which] relates to the teams capability and ability to process, interpret, manipulate and use information" (Akgün, Lynn & Yilmaz, 2006, p. 213). More specifically, it expresses a degree by which the group is capable and able to understand the work task context, to formulate a goal and focus of the work task, to figure out an effective problem solving strategy, to gather relevant information and knowledge regarding the work task and, finally, to process and disseminate that information effectively within the group. The cognitive sub-processes addressed in the study were information and knowledge acquisition, dissemination (distributing and sharing through formal and informal communication), memory (skills and experiences of team members), unlearning (eliminating or changing teams beliefs, norms and values), thinking (processes of decision-making, judgment and creativity), improvisation (simultaneous planning and implementing of an action and sense-making

(constructing, filtering, organizing and framing information in a meaningful way) and, finally, implementation (use of information for problem solving). The result of the study showed that except for 'unlearning' and 'improvisation', all the socio-cognitive processes seemed to be *interrelated* reciprocally. This means that each dimension acted both as a causal antecedent and as consequence of the others, which further points to the *multidimensional* nature of social cognition in groups or teams. Moreover, these socio-cognitive constructs, except for 'unlearning', were found to be influenced by the 'team intelligence' within the group. With regard to the effects of 'team intelligence', only 'information implementation' was found to exert a significant direct effect on project success. This dimension seemed, however, to mediate the effects of all the other dimensions, hence emphasizing the importance of *all* the socio-cognitive processes in the generation of team intelligence to guide and help problem solving.

Another aspect associated with social cognition in groups is the fact that different types of *situations* call for different types of social cognitive activity, which again depends on the quality of the specific problem-solving functions needed in order to reach a solution (Larson & Christensen, 1993). These functions depend partly on the degree to which group members have access to problem-relevant information. When, for example, all of the information needed to solve a problem is both present in the group's immediate environment and manifest to all its members, the group needs only to manipulate the information in an appropriate way to help arrive at a correct solution. When, however, the information is not openly manifested to the group, the group must spend time uncovering the problem solving information. Further, if all the information relevant to solve the problem is held by group members but not equally distributed among them, then it should be uncovered what each group member knows that may be relevant to the problem at hand. Finally, when a portion of the relevant problem solving information does not exist in the group's immediate environment, the group will be forced to suspend its current activity and to go elsewhere to obtain the missing information, hereby initiating an *active* information seeking behavior as conceptualized in Wilson's (1981) model of information seeking behavior.
In the next section the focus will shift from the group level to the group member level and the processes involved when acting as a group member.

4.3 Acting as a group member

Concerning the individual acting as group member we may ask how 'self' should be defined - primarily as an individual, a group or as a collective creation?
According to Sedikes & Gaertner (2001), persons seek to achieve self-definition in a least three fundamental ways. People may define themselves 1) in terms of their personal traits or those aspects of the self-concept that make them unique in a given social environment (the individual self); 2) in terms of group membership or those aspects of the self-concept that differentiate the group member from relevant out-groups (the collective self); and 3) in terms of contextual characteristics, that is, those aspects of the situation that make one part of one-self more accessible than the other (the contextual self). These dimensions of the 'self' may intermingle, that is, dynamically affect one another. For example, aspects of the individual self that are positive and important may form the basis for the collective self.

The general position in social psychology today is, however, that the group can be found *within* the individual (Castano et al., 2002). Hence, when speaking of a 'social identity' it refers to that part of an individual's self concept which derives from his knowledge of his membership in a social group (or groups) together with the value and emotional significance attached to that membership.

In this section, the focus is on the individual acting as group member (the 'collective self'), that is, the processes and behavior associated with the generation of a *collective cognitive mind* (as opposed to the individual mind) and the uncertainty associated with social interaction and problem solving in groups. Personal traits related to the 'individual self' have been addressed in association with personality in chapter 5. The context of the individual group member (the 'contextual self') is here referred to as the group work situation.

4.3.1 The collective mind

Due to the acknowledgement of the *dynamics* of social influences, as proposed by the social-cognitive approach, the term 'collective minds' or 'collective representations' has been re-conceptualized. Hence, the existence of *different* forms of collective

representations in groups have been recognized together with the fact that *various* factors may affect these forms of representations or consensus developed during social interaction. According to Allard-Poesi (1998), form of consensus may for example differ according to the consistency in viewpoints expressed by group members, the type of conflict that may occur due to a heterogeneity of *individual* positions in the group, group members' involvement in the task, the form of participative mode adopted by the group (formal vs. informal) as well as the form of solution chosen to solve a conflict (control, rejection, avoidance or negotiation). Depending on these factors, collective representations may be characterized by either 'conformity', 'normalization' or 'polarization'.

Conformity refers to the change in the individual's behavior or opinions towards legitimate rules and expectations of the group - irrespective of initial differences. This process is liable to emerge when the minority in a group has no counter-norm to invoke and the majority members have no reason to make concessions. As the minority lacks internal consistency, the minority will be either converted or rejected.

Normalization may help avoid conflicts. It refers to the pressure each group member exerts on the other during an interaction with the aim of reaching either a judgement acceptable to all individuals or one, which approaches complete acceptability. This is accomplished by suppressing differences and levelling off at the lowest common denominator. This mechanism is liable to arise when the members are equal in their capacities and competences so that no one can impose their viewpoint on the others. This may happen when the other group members are not involved in the issue or committed to any position concerning it, and/or when the object of the judgement has little significance or is unknown to most people in the group. In those cases, people will tend to avoid extreme positions and will adopt judgements approximating those of the others. A tacit negotiation takes place and answers are coordinated so that conflict is avoided. The group members' answers converge towards an *averaging* response as opposed to an extreme one. This may lead to a 'group and non-critical thinking', a shared illusion of unanimity that comes from the self-censure of everybody and that increases because of the assumption that 'who does not disagrees, agrees'. This mode of participation in groups, which is liable to emerge in a formal relationships context, will lead to conflict-avoidance and consequently to a compromise consensus.

However, if sufficient divergences are expressed and group members commit themselves in the decision-making process, interactions will produce a change, a polarized answer.

Polarization may result in conflict and resolution. If all members of a group express themselves freely, social influence processes result in specific answers, not in an averaging of the members' initial positions. Hence, the collective result is produced by *true* collaboration between group members - being close to the values they initially shared, though more extreme than the averaging of initial values resulting in an average position.

In this way, a 'collective cognitive representation' may correspond either to a majority position (conformity), to an average position, to which nobody really adheres (normalization) or to a new position, which has been developed by means of real collaborative decision work between group members that imply a real cognitive restructuring (polarization). This may occur not only at the social but also at the private level

In addition to the level of social responses expressed during group discussions, a private level exists which referrs to the cognitive and latent structures *underlying* the social response. Following from this distinction, a public consensus may exist in a group that is without private acceptance, named 'compliance' behavior. In turn, social influence may lead to private but not public acceptance, named 'conversion' behavior. Besides stressing the distinction between individual and social cognition, this distinction further highlights the fact that there may be a discrepancy between what is thought and what is said in social life (Allard-Poesi, 1998).

Another aspect of 'in-group collectivism' is *favoritism*, traditionally associated with similarities in values and thoughts among group members. In a recent study, Yamagishi, Jin & Miller (1998) investigated how in-group collectivism related to 'favoritism' and expectations of 'generalized reciprocity'. Through a series of experiments, they demonstrated that in-group favoritism is fundamentally not based on similar values and attitudes among group members; rather, the emergence of in-group favoritism in reward

allocation tends to occur only when subjects have expectations that other group members will reciprocate the favor they give to them[44].

4.3.2 We- and I-modes in group work

It may be stated that a person acts as a group member in his fullest sense if, and only if, the other group members collectively accept it as an action that promotes or contribute to the ethos of the group. A group's 'ethos' is the subset of topics that the group has accepted as to express its constitutive goals, values, standards, beliefs, norms etc. (Tuomela & Tuomela, 2005). It serves as a tool to constitute the group and help specify the actions that qualify as group member actions.

However, given this premise of 'group member action', two distinctive modes have been identified in group work, that is, the 'We-mode' and the 'I-mode'.

The *We-mode* is the mode of the *group perspective*, highly affected by the group ethos, and a collective commitment that dynamically 'glues' the members to each other and to the ethos of the group. The *I-mode*, on the other hand, may be defined as the *weak group perspective* where a group member acts as a private person in a group context. I-mode pro group thinking and acting is purely personal (or private) thinking and acting, without the use of a full-blown group perspective. The I-mode members cooperate *individually* intentionally, not collectively (or jointly) intentionally as the case with We-mode members. These members, in contrast, cooperate jointly towards a *shared* intended collective goal. The success of the group's acting as a group is more important than the success of a member's acting.

In any mode, however, conflicts may arise. For instance, some group members may compete and be in partial conflict. Further, group members may conflict over controlling resources, e.g., when people's individual goals include enhancing self and controlling own outcomes (Fiske, 2004). In social dilemmas, individual self-interest may conflict with collective interests, creating mixed motives. Sometimes group members avoid, reduce or accommodate conflict; sometimes they exacerbate it. When cooperation fails and conflicting interests endure, group members must negotiate over scarce resources. Accurate information about the others' preferences and priorities, as

[44] In-group favoritism and strong group ties in small group situations are, however, more strongly practiced in collectivist cultures.

well as a pro-social orientation and high concern for the others, all facilitate negotiations.

Based on this distinction between I-mode and We-mode group members, we may subsequently speak of I-mode and We-mode reasons for action, not as a constant phenomenon, but one that may change dynamically among group members over time.

4.3.3 Uncertainty in interpersonal relations

According to Berger & Calabrese (1975), the entire goal of interpersonal relations is to reduce uncertainty about the message conveyed and the relations between the communicators, being associated with a gab between two types of cognition: 1) cognition and experience and 2) cognition and behavior. Uncertainty is one of the most universal individual difference characteristics that can influence the social mind. Brewer & Harasty (1996) has proposed that uncertainty reduction is a major force behind the need for perceptions of group entitativity[45] and feelings of group belongingness. Further, the way people *deal* with uncertainty in the interpersonal context has been found to have a major impact on many kinds of strategic social behaviors, e.g. reflected in group decisions and intergroup conflicts (Sorrentino, Hodson & Huber, 2001). This is also related to the concept of uncertainty *orientation*, which is in focus in this section with regard to cooperative groups.

According to the theory of uncertainty orientation (e.g. Sorrentino & Roney, 2000; Sorrentino, Hodson & Huber, 2001), people may be characterized on a continuum from certainty-oriented (CO) to uncertainty-oriented (UO). For UOs, the preferred method of handling uncertainty is to seek out information and engage in activity that will directly resolve uncertainty, that is, attaining clarity. They may also be named the 'need-to-know' type of people. CO's on the other hand, develop a self-regulatory style that circumvents uncertainty confrontation. Such persons will generally undertake activity that does not involve uncertainty, that is, maintain clarity. If, however, they are confronted with uncertainty situations, they will rely on others and/or heuristic devices over more direct methods of resolving uncertainty.

[45] Entitativity is defined here as the degree of having the nature of an entity, of having real existence, hence a measure expressing the perceived degree of 'group entity' (Castano et al., 2002)

A phenomenon similar to the distinction in uncertainty-orientation has also been found in educational psychology, that is, in studies of students engaged in cooperative learning. Huber et al. (1992) found that individual differences in preferences for cooperative versus other forms of instructions techniques seemed to be related to differences in uncertainty-orientation. Teaching techniques emphasizing learning through self-discovery may be of value to the UO type of student, whereas the CO student may prefer traditional expository learning situations where the instructor tells them what is right and wrong. Based on these findings, UO students may find cooperative learning more facilitative over either competitive (standards are judged in competition with others) or individualistic (open expression is not encouraged) learning. CO students, on the other hand, may not desire situations where they must listen to the viewpoints of their peers as well as disclose their own ideas to others. Hence, difference in uncertainty-orientation among group members may actually hinder polarization and the development of a shared understanding as well as a collective result.

Uncertainty-orientation also plays an important role in how we view significant others and how we react to group activity. Hodson & Sorrentino (1997) found that 'groupthink', meaning the unconscious process where pressures toward group unity take precedence over rational decision making, not only occurred as a function of leadership style but also in conjunction with individual differences in uncertainty orientation. CO students, for example, more easily demonstrated group-thinking behavior and were influenced more by leadership style than were UO groups.

As this section has shown, uncertainty may be perceived in two distinctive senses, either as a *charismatic* concept (UOs) or as a *frightening* concept (COs). Depending on that, the individual group member's approach to group work and engagement in group processes may be influenced, e.g. demonstrated in an explorative versus a confirming behavior.
The uncertainty-aspect of human behavior is further addressed in chapter 5 focusing on personality, though in particular addressed with relevance to information behavior.

4.4 Group work in academic settings

This section is based on the work by Louise Limberg (1998), exploring the interaction between information behavior and learning outcome among 25 high school seniors

working *co-operatively* in five groups during a four-months period. The focus of the study was on how high school seniors seek and use information to learn about the subject content of an assignment. However, the fact that these processes took place in groups turned out to affect the outcome of the study accordingly, e.g. the group setting was found to strongly influence the students' ways of thinking and acting.
In this way, the study has contributed to the understanding of information behavior among group members in an academic setting working in a joint intellectual effort towards a shared goal.

4.4.1 Limberg's study of group work and the ISP

The study was carried out in 1993/1994 involving 25 students (18-19 years old) working on an assignment of 20 pages to be submitted in a four-months period. The students were required to work in groups and choose a subtopic under the broader topic 'EU membership'. The ISP-model formed the basis of the emperical study, which comprised 80 interviews during the process, observations in the school library as well as written reports and teacher assesments. With regard to the social dimension of information behavior, a separate analysis of the interviews was concerned with cooperative learning, guided by four questions: 1) how was the group set up – based on subject interest of group members? 2) how was group work organised – any division of responsibility? 3) how was the intensity and progression in the work? and 4) how was conceptions of cooperative learning – previous experiences, apprehensions etc. The result of the analysis indicated two main differences between the five groups, demonstrated in their *approach to the assignment and topic* and in their *approach to co-operative learning and group work*. Three categories derived from that, which signified participants' interest in the topic and the work task in general: 'weak', 'medium' and 'strong'. With regard to the groups' approaches to group work, two main categories were developed that characterized approaches as either 'holistic' or 'atomistic'. The *holistic* approach was characterized by groups acknowledging the value of group work and considering group work as a collective task towards a shared goal, implying various group activities to succeed. They considered the establishment of a shared knowledge base as very important, which was demonstrated in their information behavior. Information was exchanged among group members and they informed each other of the outcome of read texts. Moreover, they marked relevant parts of text to each other and circulated the information afterwards. The information search, itself, was delegated to individuals or minor groups, so that some were in charge of searching specific

databases, libraries etc. while others should get in contact with specific institutions and organizations. The holistic approach to information behavior also resulted in *shared* relevance criteria, affecting their judgement of information accordingly. Further, the holistic group members tended to reinforce each group member's perceived cognitive authority of specific information sources. In addition to this, the existence of different opinions with regard to the topic was only considered to be an advantage to the analysis and process of construction. Compared to the theory on group work, the holistic approach to group work has many elements in common with the conceptualization of the 'collective mind', the behavior of UOs (uncertainty-oriented people) and the implications of possessing a 'We-mode' perspective to group work.

In contrast to this, the *atomistic* approach was characterized by groups of *individuals* that had organized the group work according to specific parts of the assignment that had been delegated to each group member. They were generally lacking a perception of the 'whole', meaning that the collective product to be submitted. The work was divided between the group members and they did not meet outside the school schedule, hence worked more on an individually basis. This was also reflected in their approach to information behavior, since they did not effectively communicate information in the group, nor aimed at building up a shared knowledge base. The result of the atomistic approach was demonstrated in a weak learning outcome. They were, however, positive towards group work in the sense that it made them feel more confident compared to working individually as one may help each other in groups. This was to some extent related to their type of personality, since atomistic group members often tended to lack confidence, both with regard to themselves and the other group members.

This approach to group work has many elements in common with the behavior of COs (certainty-oriented people) and the 'I-mode' perspective of group workintroduced earlier.

Based on these characteristics of the participating groups, Limberg (1998) found that degree of interest in the topic and the assignment tended to co-relate with the group approach to group work, thus, resulting in the following three group characteristics:

- Weak topic interest and an atomistic approach to group work
- Medium topic interest and a holistic approach to group work
- Strong topic interest and a holistic approach to group work

As indicated above, these characteristics were further reflected in the groups' approach to information behavior.
Depending on the sub-topic chosen, each group developed its own pattern. Three of the groups were formed due to the 'right' group members, while one group was formed due to the topic and yet another due to conditions of the situation. Moreover, the majority of the groups worked collaboratively towards a shared goal, while one group (the situation formed group) distributed the responsibility among group members, even the analytical part of the assignment. The same group demonstrated also different attitudes towards group work and ended up in frustration due to a bad group practice.

The results from the study showed that information behavior in a group based setting may be influenced by the group context, the situation (the assignment), the individual and the content of information associated with the interest of topic. Concerning the social aspect of information behavior in focus here, the group setting and their composition was found to strongly affect information behavior, as well as the learning outcome. The holistic approach to group work, for example, tended to contribute positively to these processes, while the *atomistic* approach tended to do the opposite, e.g. demonstrated in distributed responsibility of the work task, no shared knowledgebase, weak learning outcome and frustration due to group conflicts.

4.5 Summary

This chapter has addressed various aspects associated with the *group* as a problem-solving unit, meaning the group and the social-cognitive processes and interactions implied by group work that distinguishes it from individual problem solving. 'Group' is here conceptualized as *primary* in terms of a small group involving co-operation towards a common goal. The focus has been on the characteristics of groups as problem solving units, individuals acting as group members, the cognitive sub-functions involved in group based problem solving, and the affective experiences related to group work.

Groups as problem solving units develop through a series of four stages – from forming to performing. Idealistic, this should result in a *collective* unit based on a shared group ethos (We-mode) and true collaboration implying a free and frank exchange and discussion of views towards a *collective* result.

Various factors, however, may affect the form, processes and outcome of group work. The type of task, for example, may primarily be intellective (a right solution exists) or judgemental (values and opinions are important), affecting the behavior accordingly. In the first case, group work will be guided primarily by *cognitive* motivations and goals, whereas in the latter, *social motivations* and goals will be in focus. The interplay between cognitive or social motivations and goals may contribute to problem solving, but may as well get into conflict, preventing collaboration towards a shared goal. This apply also to other types of conflicts, such as interpersonal conflicts and conflicts derived from an inconsistency among group members in position or their approach to group work (holistic vs. atomistic). These factors may also affect the generation of a *true* collective representation in the group (a collective mind based on cognitive re-structuring), hence resulting in either conformity, normalization or polarization. In addition to this, a number of interrelated socio-cognitive sub-functions (or sub-tasks) may help generate the team or group intelligence needed to solve the problem at hand. Besides problem identification, problem conceptualization, information acquiring, using and implementing, cognitive sub-tasks in groups may be *distributed*, *shared* and *stored* collectively, thus, establishing an *external* memory in addition to the individual memory of each group member.
Group members' behavior may also differ according to their orientation towards group work, that is, whether they are situated in a We-mode or an I-mode. The distinction between I-mode and We-mode group members may help explain reasons for action and behavior, not as a constant attribute of one group member, but as a dynamic phenomenon that may change over time *among* group members.

Besides the cognitive skills required from each group member in order to generate group intelligence, interpersonal and managerial skills are also necessary for the group to succeed. The interpersonal skills should, for example, contribute to the social satisfaction of problem solving whereas the managerial skills should contribute to the mere group process forming a cohesive and effective operating unit (a group).

Affective factors, such as uncertainty orientation, also play an important role in group work, meaning that how people deal with uncertainty in their personal lives may also affect their interpersonal and strategic behavior in groups. Frustration may, for example, as well arise in groups as a result of group conflicts, as demonstrated in the work by

Limberg. On the positive side, performing groups (the last development stage) constituting a collective we-mode unit, may result in perceptions of entitativity and feelings of belongingness contributing positively to the quality of the collective group result.

To sum up, the theory and research presented in this chapter on the socio-cognitive processes and interactions implied by group work have demonstrated that group based problem solving is quite different from individual problem solving. Moreover, with relevance to information behavior, the impact of the group setting and the complexity of group based problem solving has been highlighted.

5 Personality

This chapter addresses the *personal* dimension of information behavior, that is, the personality and psychological aspects associated with individual group members, which may affect or interact with their information behavior in addition to group work and task based problem solving.

According to Solomon (2002) and Wilson (1999) information behavior is dynamic and changeable, and includes the person's *inner* processes as well as influencing *outer* factors, which in both cases affect the individual's way of responding to his/her information need. Where the last two chapters have focused on work task and social factors, this chapter focuses on the influences from personal factors – factors which have been acknowledged already as important in models of information (seeking) behavior (Wilson, 1981; 1999; Wilson & Walsh, 1996).

The first section presents the characteristics of 'personality' that exist across individuals, involving the five core personality dimensions often referred to and employed in psychological tests on personality. The next section focuses on the relation between personality and information behavior, primarily as demonstrated in the work by Jannica Heinström (2002).

The aim of the chapter is to point to characteristics of the individual that may help explain activities and experiences experienced by the *individual* group member. In addition, it constitutes the underlying theoretical framework for the personality test carried out in case study 2, section 8.6.1.2.

5.1 The concept of personality

Personality is that pattern of characteristic thoughts, feelings and behavior that distinguishes one person from another and persists over time and situation (Phares, 1991, p. 4). It is the sum of biological based and learnt behavior, which forms the person's unique responses to environmental stimuli (Ryckman, 1982, 4-5).

According to Ryckman (1982), personality should be hypothetically understood. It denotes a *tendency* to behave and react in a specific way dependent on the specific situation, which means that dependent on the situation, personality traits may be more or less visible. For example, persons characterized by high emotional instability are more likely to feel anxiety in a threatening evaluation situation than calm and stable persons. Hence, personality states and behavior should be regarded as the result of personality traits *combined* with the situation. Following from that, personality traits should be regarded as *dispositions* to states rather than absolute and predetermined characteristics of human behavior (Humphreys & Revelle, 1984). In addition, expressions of personality are dependent on age and maturity, hence, may develop over time.

All persons may be characterized according to five core traits or personality dimensions, also referred to as the five factor model.

5.1.1 The five personality traits

The five-factor model consists of five basic dimensions (with associating facets) used to describe differences in cognitive, affective and social behavior (Skovdahl Hansen & Mortensen, 2003). Each of them is described below.

Neuroticism or (inversely) *Emotional Stability*
Describes a tendency to worry. People who score low on this factor are usually calm, relaxed and rational and may sometimes be perceived as lazy and incapable of taking things seriously. People who score high on this factor are alert, anxious and sometimes worried.

Extraversion
Describes how ‘energetic’ one is. People who score high on this factor like to work in cooperation with others, are talkative, enthusiastic and seek excitement. People who score low on this factor prefer to work alone, and can be perceived as cold, difficult to understand, even a bit eccentric.

Openness to Experience or *Openness to Ideas*
Describes a tendency to be reflective and imaginative. People who score high on this factor are curious towards their inner and outer world, such as emotional experiences

and new and unconventional ideas. Their life is often rich on experiences. Open people are also more sensitive to negative and positive feelings than closed people. They may sometimes be unrealistic in their approach to life. People who score low on this factor are down-to-earth and practical, and sometimes obstructive of change.
When conflicts are due to differences in personality, it is usually due to differences in 'openness to experience'.

Agreeableness
Describes one's level of orientation towards other people. Those who score high on this factor are usually co-operative, can be submissive, and are concerned with the well-being of others. People who score low on this factor may be challenging, competitive, sometimes even argumentative.
'Agreeableness' and 'extraversion' are also regarded as the two 'social' factors. People who score higher than midrange on both of these factors and who possesses an above average intelligence quotient, tend to have high emotional intelligence as well.

Conscientiousness
Describes how 'structured' one is. People who score high on this factor are usually productive and disciplined and 'single tasking'. People who score low on this factor are often less structured, less productive, but can also be more flexible, inventive, and capable of multitasking.

5.2 Personality and information seeking

Given that everyone has a unique pattern of feelings, thoughts and behavior which is formed by a fairly stable combination of personality traits (Phares, 1991), the individual and situated information seeker has been hypothesized to behave in accordance with his/her personality traits[46].

The decision to seek information has often been modeled as being motivated by a cognitive gab (e.g. Belkin, Odely & Brooks, 1982). However, information needs may

[46] In this case, information seeking as sub-task constitutes a situation, in line with Table 3.2 of the conceptual matrix of task levels applied to the group member in context

also be emotionally motivated, in line with Allen (1997), here emphasizing the *psychological* barriers to problem solving (Wilson, 1981; 1999; Wilson & Walsh, 1996).

Solomon (1997b) has also proposed that information seekers' typical patterns of affective responses may differ from each other according to personality traits.

Kuhlthau (1991; 2004) has identified uncertainty resulting from unfamiliar situations or from a knowledge gab related to the information seeker's level of progress in work; but uncertainty may also be related to the person's personal traits such as neuroticism (insecurity and pessimism) as identified by Heinström (2002) and Wilson et al. (2002).

This relation between psychological factors and personality dimensions on the one side and information behavior in academic settings on the other has been explored in a number of studies (e.g. Goulding et al., 2000; Heinström, 2002; Kernan & Mojena, 1973; Kirton, 1989; Palmer, 1991).

Based on a study of three groups of university students' use of information in relation to their personality, Kernan & Mojena (1973) identified three groups of information seekers: the *ritualistic*, the *efficacious* and the *venturesome* group. The first group used an amount of information, was responsible, but had a lack of confidence. Information seeking tended to exaggerate. The second group demonstrated an average behavior - both in relation to amount of information and personality scores (in a personality test). The last group distasted routines and was more risk-taking, dominant and self-confident, though also social, and tended to seek less information.

Kirton (1989) explored two opposite modes of problem solving among students, that is, decision making and creativity. In association with these modes, he identified two types of behavior: the *adapters* and the *innovators*. The first type of students was characterized by being dogmatic, anxious, withdrawn, conscientious introvert and conservative. In contrast, the second type of students was characterized by being open, extraverted and more confident. The students belonging to that group constructed their own models and questioned the present paradigms.

This was further tested by Palmer (1991) in a study of scientists' information behavior. In addition to the results above, it was found that innovators searched information widely and used many different sources, whereas adaptors were vulnerable to social

pressure and authority, doubted their abilities and had a more controlled, methodological and systematic approach to information seeking.
Recently, the work by Heinström (2002) has further explored the relation between personality and information behavior in an academic setting, which is presented in the next section.

5.2.1 Heinström's study of personality and the ISP

Heinström (2002; 2003a; 2003b) has investigated how personality traits influence information strategies, that is, what guides information behavior in academic settings and how is this related to study approach. As part of her thesis, 305 university students writing their master's thesis at Åbo Academi University in Finland participated in the study that lasted from January – May 2000. The participants represented all faculties at the University. Data on participants' personality was quantitatively collected by the use of the NEO-Five factor Inventory (NEO FFI)[47], which is based on the five factor model of personality. These data was analysed and compared with the students´ study approach, disciplines and stage of the thesis process.

The results demonstrated that the information dimension "…could be connected to all the personality dimensions tested in the study" (Heinström, 2003a, p. 1). This is described in further detail below.

5.2.1.1 Personality types in information seeking

In general, *secure* persons had a constructive and positive attitude towards information and appreciated a large recall – the more secure, the more actively they searched for information. They were more accepting of new information and prepared to possible changes than insecure persons. The inner security was reflected in self-reliance and confidence, hence making new information less threatening. *Insecure* people, on the other hand, had difficulties in coping with unpredictability, disorder and ambiguity in search systems; they were less likely to change their views and accept new information.

[47] NEO FFI is a *short* version of the Revised NEO Personality Inventory (NEO-PI-R) by Costa & McCrae (1992). The latter inventory is further described in chapter 8 in relation to the data collection methods employed for case study 2

Insecurity was found to be linked to *neuroticism*, hence a potential barrier to information seeking. For example, various psychological barriers to information seeking were identified. 'History of failure' in relation to searching was seen as an initial obstacle to successful database searching, which means that the estimation and expectation of one's own capabilities is often more influential on performance than the actual skills one possesses (Bandura, 1986). Time pressure also seemed to affect the effort and time spent on information seeking. Familiar documents and information that confirmed old knowledge was often preferred implying a feeling of control, whereas new information might instead stress and cause confusion.

Extraverted students tended to demonstrate an enthusiastic, active and confident character, which was reflected in their information behavior as well. They were active seekers, but more superficial in their use of information (lower marks). In addition, they preferred to spend time on social activities instead of studying.

Students characterized by being *open to experience* were more successful in grades; hence the motivation behind broad information seeking was decisive for information use and outcome. An open information attitude was particularly important at the initiation stage of problem solving. An inherent environmental scanning was identified in their curiosity and attitude towards life. A high level of openness seemed to increase information encountering. Students preferred a broad range of information rather than few precise ones, they critically analysed information and were not afraid of new information content. These students could be compared to the *innovators*.
Conservative students, on the other hand, wanted to avoid new challenging ideas, thus implying a cautious information-seeking attitude, which was narrow in content aim as well as in conduct. They could be compared to the *adaptors* who were reluctant to new ideas and conservative in their character. Conservative students preferred clearly and recently written documents and overviews (standard quality criteria); used printed sources and group sources, liked lectures and did not show interest in mass-media and internet sources.

Students with a low level of *agreeableness* were characterized by impatience, experiencing lack of time and time pressure, implying that they did not devote enough time to information seeking. Competiveness may, however, be useful in an academic context, implying sceptical and critical thinking.

Conscientious students were found to be willing to use effort that is, time, money and hard work to obtain relevant information. They were goal oriented and responsible students, and were determined to achieve, also academically. They tended to prefer thought-provoking documents. Students characterized as being more careless got easily distracted, were impulsive and hasty. Lack of time was a barrier to information seeking. Their choice of information was guided by a need for quick answers and they often had problems with relevance judgement. They preferred confirming documents.

The personality dimensions and their accompanying information behavior characteristics as identified by Heinström are shown in Table 5.1.

Personality dimension NEO-PI-R	Low level	High level	In relation to information behavior Heinström (2002; 2003a):
Neuroticism	Secure Confident	Insecure Sensitive Nervous	H: Preference for confirming information, resistance towards new information, difficult to judge relevance, insecure. Little effort and persistence in information seeking, lack of time a barrier, gave up easy. L: Constructive and positive attitude towards information, appreciated a large recall and were more prepared to possible changes. The more secure, the more actively they sought information.
Extraversion	Shy Withdraw	Outgoing Energetic	H: Informal IR, preference for thought-provoking documents, wanted to find much information, preferred quick solutions and use of social abilities – consulted often teachers, supervisors (literature suggestions). Social interaction was an important part of their information behavior. Information use may be more superficial. L: Was not identified in the study
Openness to experience	Cautious Conserva-tive	Inventive Curious	H: Broad information seeking, incidental information acquisition and critical information judgement. Preferred thought-provoking documents, driven by intellectual curiosity. L: Conservative in relation to relevance judgement, preferred confirming documents.
Agreeable-ness	Compe-titive Out-spoken	Friendly Compas-sionate	H: Was not identifeid in the study L: Lack of time, impatient, did not prioritize information seeking, competitive, critical information judgement. Competiveness useful in academic settings; implies a sceptical and critical thinking.
Conscien-tiousness	Easy-going Careless	Efficient Organized	H: Preference for thought-provoking documents. Willing to use effort – time, money and hard work – to obtain relevant information. Determined to achieve, also academically. Structure and persistence related to mastered information seeking. Goal-oriented, knew their aim and were responsible students. L: Carelessness was related to problems with relevance judgement; lack of time was a barrier to information seeking, preferred confirming documents. Got easily distracted, were impulsive, hasty, and choice of information was guided by a need for quick answers.

TABLE 5.1. The five personality dimensions and their accompanying information behavior characteristics.

H= High level; L= Low level. (Adapted from Heinström (2002; 2003a)).

5.3 Summary

This chapter has focused on the psychological mechanisms derived from personality and its impact on information behavior, hence showing how *person* dependent the information seeking process is and how important it is to acknowledge that each individual has a unique way of seeking information.

Although regularities and patterns in information-seeking behavior have been found (for example, by Kuhlthau, 1993), there are always exceptions to the general pattern, which are often not accounted for within the framework of the various information models (Heinström, 2003a). As the work by Heinström suggests, personality differences is one factor that may explain these exceptions. However, personality disposition is far from deterministic - human reactions can never be predicted with certainty. The disposition within the individual also interacts with *contextual* demands, meaning that the core personality will remain the same, but the way it is *expressed* and how much it *influences* behavior varies according to the context or situation[48]. Transferred to the group setting in focus here it may be hypothesized that personality dispositions within the individual may change or be expressed differently during a project assignment, not only due to cognitive stimuli, as suggested by Kuhlthau (1991) but *also* due to work task factors such as stage in the process, and group work factors such as social interaction.

This chapter on personality was the final influencing factor to be addressed in reply to the research questions. To sum up – and with relevance to the empirical part of the present work - each of the three factors or dimensions of information behavior (work task, group work and personality) has demonstrated and emphasized the importance of examine information (seeking) behavior - not *solely* with a focus on the individual's cognitive processes - but from a *broad* perspective, in line with Wilson (1997; 2000) and Ingwersen & Järvelin (2005).

The next part of the thesis concerns the empirical part, that is, the methodological considerations and the research design and results associated with two case studies exploring group member's information behavior in context.

[48] Context is here referred to in the broader sense, involving both social, cultural and organisational factors, as touched upon in the previous chapters.

6 Methodological considerations

This chapter describes the methodological considerations in relation to the research design of two case studies (hereafter case study 1 and case study 2). At first the theoretical and empirical framework is outlined which places the individual group member in a complex contextual setting that acknowledges the impact from personal, social and work task related factors on information behavior, as presented in the theoretical part. Next, the research design and research strategy is described, which relies on a longitudinal case study approach. Finally, the metatheoretically approach chosen for this study is presented.

6.1 Introduction to case study 1 and 2

In order to explore and gain insight into the characteristics of group members´ information behaviour and problem solving processes, two *case studies* have been carried out exploring Kuhlthau's (1993; 2004) ISP-model in a group-based setting of students. Both case studies were carried out at the Royal School of Library and Information Science in Denmark.

The research design for both case studies was based on a *qualitative* and *longitudinal* research approach concerned with an understanding of the individual group member's behaviour and experiences during a project asignment.

The aim has been to develop concepts or hypothesis of group members' information behavior in context to be further tested and enriched in future studies.

Figure 6.1 below shows the focus and dynamic levels of analysis of the study as well as the relation between the two case studies that form the *empirical* foundation of the thesis (case study 1 and case study 2) [49]. In both studies - of longitudinal nature - the focus has been on the *individual* and *situated group member* (I) with his or her personal

[49] The legends have been assigned to case study 2 in the figure but hold for case study 1 as well.

characteristics and interaction (↔) and experience with the group (G) and the work task (W) during time (T). The focus on the individual is indicated by a bold circle which will change in accordance with the group member in focus. The bold arrow indicates a dynamics between the three levels or dimensions which should be further explored: *Individual* (personal), *Group* (social) and *Work task* (contextual). As indicated in the model, the outcome and methodological results from case study 1 (C1) both forms the basis of the design (D) as well as the analysis (A) of case study 2 (C2).

This model corresponds to a large extent with the *holistic* model developed by Ingwersen & Järvelin (2005) and presented in section 2.3.5.

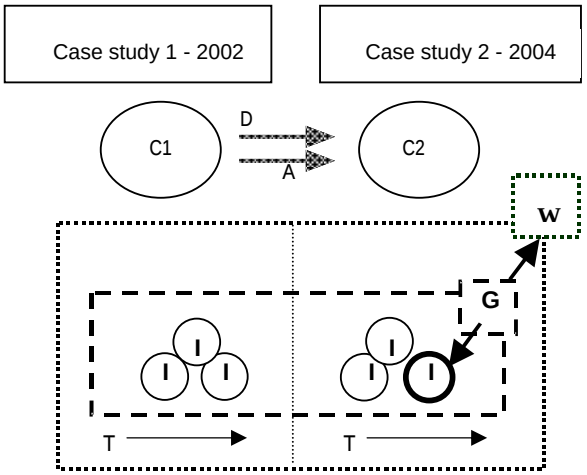

FIG. 6.1. Conceptual model of case study 1 and case study 2.
(legend in text)

To frame the underlying theoretical understanding of information behaviour, Wilson's (1999) *nested* 1996 model of *information behavior* at page 30 has been used. According to this model, also personal (individual), social and environmental factors are acknowledged as variables that may help understand and explain group members' information behaviour.

Focusing on the *situated individual group member*, Allen's (1997) integrated 'person-in-situation'-approach has been used to reflect and understand information behaviour from a group member's perspective. The integrated approach demonstrates the

interaction and dynamics between 'individual' and 'group', between personal and social factors as well as between situational and contextual factors associated with information behaviour. Though the focus in this approach is on individuals' information needs, a unified and coherent understanding of information needs can only be obtained as researchers consider the *problem situations* that give rise to needs and the *information seeking behaviors* that resolve those needs in terms of interactions between personal and situational variables (Allen, 1997, p. 121). As pointed out by Allen (1997), this will require more complex research designs and more sophisticated data analysis than those studies that simply focus on individual *or* situational variables. This further have motivated the integration of individual, social and contextual factors in the present research design and exploration of Kuhlthau's (1991; 2004) ISP-model.

To explore the ISP-model in a group based setting, the research design of the two case studies have to a large extent been construed in accordance with the methodological framework from which the ISP-model has derived. Hence, the individual group member has been followed over time while he or she is preparing a project assignment, that is at start, midpoint and at the end. In each case study, the project assignment (the work task) has been addressed at a *descriptive* level, defining a particular item of work (Byström & Hansen, 2005, p. 1051) and at a *process* level, focusing on the group member's task processes during time.
In line with Kuhlthau (1991; 2004), the focus in both case studies has been on individuals' *actions* as well as *cognitive* and *affective experiences* during a project assignment. In this study, however, actions and experiences not only relate to information seeking activities, but also to actions and experiences derived from group work (social factors) and the work task (contextual factors).
In addition to this, many of the methods[50] used by Kuhlthau (1991) have also been applied in this study[51]. The specific data collection methods being employed and the

[50] Many of the methods used by Kuhlthau (1993) have been applied in the two case studies, except for the methods used in the second study of the ISP-model. The second study of the ISP model was a longitudinal, *quantitative* follow-up based on T-tests of perception questionnaires. See also Table 2.1.

[51] The use of various methods – triangulation - is often seen in case studies as a way to provide an in-depth exploration of a complex phenomenon as well as to help validate important findings in the data.

approaches to data analysis in each case study are described in detail in chapter 7 (case study 1) and chapter 8 (case study 2).

To further support an understanding of human behaviour from an 'insider' perspective, *phenomenology* has been used as a metatheoretical framework to stimulate the collection and analysis of data, specifically demonstrated in case study 2 by the employment of Dervin's Sense Making approach.

The conceptualization of a case study approach, a longitudinal study and a phenomenologic approach is described in more detail below - at a general level as well as in relation to the two case studies.

6.2 Case studies

The case study method is a research approach that emphasizes single entities, such as a a campagn, a decision process, a person, a group, an organization or a nation. It is an appropriate method for studying a phenomenon with a large variety of factors and relationships (Fidel, 1984). According to Stake (2000), a case is a complex entity operating within a number of contexts. Thus, a case is always situated which emphasizes the context of what is being studied, for example, the individual in his or her social world with as many of the key actors, connections, interactions, situations, processes and information as can be identified.[52] Using case studies is actually not a

[52] Case studies, longitudinal studies and organizational research all emphasizes the significance of context in information seeking. However, the approach to context may vary, affecting the research approach and outcome accordingly. The *objective* approach emphasizes that needs, seeking and use are situational, but seeks to find universal laws or patterns of behavior across cases (Talja, Keso & Pietiläinen, 1999). Social, cultural, personal, situational and organizational factors are conceptualized as discrete and separate entities that constrain or motivate individuals' behavior in various ways. Hence, context refers to objective reality. The *interpretative* approach conceptualize context as a carrier of meaning. Data are not understood as straightforward description of reality; rather, data represent social reality. In this view, observation, interviews and diaries represent different contexts of interaction and sensemaking, but none of them are authentic descriptions of reality, rather, they reflect an interpreted and mediated reality based on historic, cultural and social experiences.

choise og methodology, but a choise of what is to be studied. Stake (2000) presents three types of case studies:

1. The *intrinsic case study* focuses on the case itself e.g. to obtain a better understanding of that particular case. Hence, research is not undertaken primarily because the case represents other cases or because it illustrates a particular trait of a problem or phenomenon that may result in theory building.
2. The *instrumental case study* examines a case mainly to obtain and provide insight into an issue or to redraw a generalization. Hence, the case itself is of secondary interest, but plays a supportive role by facilitating our understanding of the problem of phenomenon in focus. The case is generally looked at in depth and its contexts are scrutinized.
3. The *collective case study* is an instrumental study extended to several cases, either similar or dissimilar and may be used in connection with a grounded theory approach, meaning that the one study grounds the design of the other, hereby contributing to theory building step-by-step. The goal is to obtain and provide a better understanding of a still larger collection of cases regarding e.g. a phenomenon or a population or a better theorizing.

According to Stake (2000), it may be difficult to strictly categorize studies into one of these case types. For example, an intrinsic case study may also result in insight concerning a phenomenon surrounding the particular case of interest. He therefore suggests to look at the three case study types as heuristics rather than determinative categories.

As such, a case study can be both a *process* of inquiry about a case and the *product* of that inquiry (Stake, 2000).

Because a case study by nature constitutes an inquiry into a *single* case, generalizations can often be hard to make. However, to improve the case study strategy, more data collection methods and sources of evidence as well as times of observation are recommended – together with a holistic and process-oriented emphasis (Case, 2002). In the present study, for example, this is reflected in the choise of a longitudinal study approach as well as in the choise of methods to triangulate groups members' actions and and experiences as experienced by them. Observation of subjects in natural settings is often employed as a data collection method in case studies. However, the presence of an observer may not always be possible or desirable. In these cases, the data may be

recorded and administered by the subjects themselves, for example by keeping a diary or a journal, which was the case in the study of group members.

When analysing the data from case studies, the focus is often on the search for patterns, explanations of causal relationships and analysis of change over time (Wang, 1999). Independent of type of case study, the outcome of the case study strategy is generally insight that may help identify problems, refine theory or suggest complexities for further investigation.

With regard to the case study strategy employed in the present work, case study 1 and case study 2 both demonstrate characteristics of the *instrumental* and the *collective* case study approach. In accordance with the former approach, each case study follows group members during a project assignment process with the aim of getting insight into group members' information behavior and the influencing factors. Hence, the focus is less on the specific groups participating in each study than on the specific theme or phenomenon of interest. However, if looking at the overall research strategy, the study consists of *more* case studies where the first case study should ground the design and the analysis of the second case study (as presented in Figure 6.1 of the reseach design model). Hence, we may also define the study as a *collective* case study due to which the stepwise study approach should aim at providing insight and help theory building.

6.3 Longitudinal studies

In line with Kuhlthau (1993; 2004), the study of group members' information behaviour was based on a longitudinal study approach. Many conceptions of the *longitudinal study* exists in literature (e.g. Eldredge, 2004; Thomson & Holland, 2003; Wang, 1999). Thomson and Holland (2003, p. 233) talks about the *true* longitudinal study which they define as the "…method for monitoring an individual's experience of change across a lengthy span of time - years or decades". This is a rather restrictive perception of 'longitudinal', meaning that data collection over a minor span of time, such as 6 months, equalizes studies carried out only once. Eldredge (2004), on the other hand, refers to the longitudinal study as one out of three types of *cohort studies:* 1) prospective 2) retrospective and 3) longitudinal. A cohort study essential tracks over time a defined population that shares a set of common characteristics as the population encounters the possible intended or unintended exposure to a phenomenon – and any

subsequent observable change in the population putatively brought about by the exposure. Where the 'prospective' and 'retrospective' cohort study refer to the time of data collection according to the time of exposure, the 'longitudinal cohort study' is characterized by the employment of multiple measurements that are taken at regular intervals within the cohort study. Hence, a 'longitudinal cohort study' refers to a chain of data collection points *over time*. A similar differentiation can be seen in Wang (1999, p. 80), when she points out that behavioural research often implies more than one data-collection method in *multiple phases* or *over a period of time*, which we in this context interpret as equalent to 'cohort' and 'longitudinal'. Some researchers (e.g. Thomson & Holland, 2003) have pointed to the challenges inherent in the open-ended nature of 'true' longitudinal research, meaning that analysis and data collection never finish, hence making it difficult to deside when to start making interpretations. If, on the other hand, we understand longitudinal as a 'period of time', we acknowledge that the start and ending of a longitudinal study can be defined, that is, when the data collection and analysis should begin and stop.

Hence, in the present study, 'longitudinal' is defined as a *period of time* in line with Wang (1999). It is associated with the specific case study in which the *same* group members are followed over a period of time. In this case the period is determined by the start and ending of the project assignment. The overall study of group members' information behaviour consisting of two cases studies may be referred to as a cohort study or 'multiple phases', meaning that the one case study contributes to the design and analysis of the other, as demonstrated in the model in section 6.1.

6.4 A phenomenological approach

The study of information behavior as perceived and experienced by the individual group member in context has been framed by the metatheoretical[53] and philosophical approach named *phenomenology*. [54]

[53] Metatheory is "a theory concerned with the investigation, analysis or description of theory itself" (Webster's Unabridged Dictionary, 1996-2006). According to Bates (2005), metatheory can be seen as the philosophy behind a theory, the fundamental set of ideas about how phenomena of interest in a particular field should be thought about and researched.

According to Scheler (1937, p. 137 in Budd, 2005) phenomenology cannot be regarded as a method since it does not provide a formal construction for investigation; it is rather an attitude, a way of preparing oneself for inquiry, for seeing. Basic to phenomenology is the contention that the world has no meaning apart from consciousness, meaning that reality is regarded from the perspective of consciousness. However, the relationship is reciprocal, meaning that consciousness has no meaning apart from the world, as stated by Merleau-Ponty (Merleau-Ponty, 1945, p. 491-492 in Zahavi, 2005). This is in contrast to the idealistic objectivism found in natural science which believe that reality can be studied appart from any subject, consequently also apart from the subjectivity of the scientists themselves.

Phenomenology means the science of phenomenons. A phenomenon is something that appear to ones consciousness as an *object of experience*. It can be anything – a tree, an atom, an idea which can be experienced either perceptually or as part of a thought (Langergaard, Barlebo Rasmussen & Sørensen, 2006). Phenomenology seeks then to describe how something appears to a subject's consciousness and how it expresses itself. Conciousness, however, including the mental acts that accompany many of our perceptions - is not merely a passive blank slate on which phenomena write. Consciousness is an active part, that is, directed at something, and it has a purpose, hence also called *intentional* (Langergaard, Barlebo Rasmussen & Sørensen, 2006). When the consciousness directs itself towards a phenomenon, the phenomenon itself become part of that consciousness, meaning that both parts are in principle subjective. As indicated in previous chapters, many studies of individuals' information seeking behavior have ignored this dialogic nature of consciousness.

The knowledge of a phenomenon may be more or less adequate. The important thing is to get to know the *essentials* of a thing, that is, to pin down the essential aspects of the complex phenomenon that appears to the individual subject. Further, the aim is to *understand* the thing as it is in nature, rather than to generalize empirically or to theoretically explain causalities between phenomenons. To understand the 'thing', we need to be able to separate it from what we may also call its *horizon* and *lifeworld*. The

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[54] The German philosopher Edmund Husserl (1859-1938) is regarded as the founder of the philosophical approach phenomenology. However, other prominent phenomenologists have contributed to the progress of phenomenology, such as the student of Husserl, Martin Heidegger, Alfred Schutz and Maurice Merleau-Ponty, to mention a few.

horizon is the *specific* background of meaning that frames the understanding of the phenomenon which the subject's consciousness is directed at and which differ from the phenomenon in focus. If, for example, one directs ones consciousness towards a dog, it will appear as a dog based on ones general knowledge and understanding of dogs or based on what else surrounds the dog or the phenomenon in focus. The lifeworld is the *general* background of meaning, the immediate and unreflected experience of the world that always frames the subject's experience of a phenomenon, also referred to as the 'lived' world (Langergaard, Barlebo Rasmussen & Sørensen, 2006). The lifeworld also forms the social and cultural context of meaning (Zahavi, 2005). The subject does not only understand himself based on self perception but also based on how he is perceived by other subjects. We may say that subjectivity is bodily imbedded in a social and cultural context.

From a scientific perspective, 'lifeworld' constitute the pre-scientific world of experience, meaning that it is the premise to scientific investigation and cognition. Understanding science therefore also implies an understanding of the lifeworld from which it derives. The relationship between science and lifeworld is, however, not a static one. As stated by Zahavi (2005), science and lifeworld dynamically contribute to the advance of one another. Science may get absorbed into praxis and become part of the lifeworld and the lifeworld may contribute to a systematic development of cognition.

Figure 6.2. shows the dynamic interrelation ↔ between 'perceived phenomenon', horizon' and 'lifeworld' from the perspective of the individual subject (in bold).

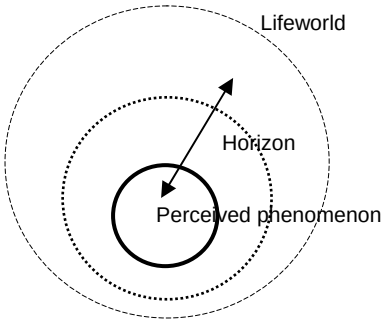

FIG. 6.2.The interrelation between perceived phenomenon, horizon and lifeworld in phenomenology

As indicated by the model, the complexity of human condition involves perceiving reality at a point in time, in a place, within a social context, in a psychological state (Budd, 2005). In line with the qualitative methodology employed by the collective case study approach, the phenomenological approach has been used in the present study to understand phenomena based on the individual group member's (subject) own perspective and to describe the world as experienced by the group member, thus acknowledging that 'reality' is what *humans* perceive it to be. In both studies, for example, data collection have been based on self-administered recordings and observations of phenomena as perceived and experienced by the individual group member, *situated* in his or her lifeworld. In addition, the analysis of data has focused on revealing experiences and reflections on phenomena from the perspective of the individual and situated group member.

The next chapter presents and discusses the first case study, case study 1.

7 Case study 1

This chapter presents the research design and the results of case study 1, that is, the research focus, the participants, the work task the methodological framework and the outcome. The research interest in the first case study has been to explore Kuhlthau's ISP-model in a group based setting; hence, the results are primarily presented and discussed in relation to how group based behavior correspond to or differ from the individual in the ISP-model. The outcome and the methodological results from this study also form the basis of case study 2[55].

7.1 Design of study

Case study 1 was carried out from April to May in 2002 and followed two groups of information science students during the process of making a term project assignment. During a four-week period each student of the two groups kept a diary of his or her activities and information-related behaviour. Each student was interviewed three times during the period with reference to his or her diary statements.

7.2 Research focus

The research focus of the study was twofold:

- To explore if group members would behave differently from the individual modeled in the ISP-model and why.

- To explore if intragroup members would demonstrate different behaviours or they would assimilate and turn the group into 'an individual', in another sense.

[55] Case study 1 has also been presented and discussed in Hyldegaard (2006)

These questions were addressed by employing Kuhlthau's ISP-model and taking into account the work task (context) and group work (social) factor. The personality factor did not enter into the research design of this study, but was later identified as an influencing factor that may help explain differences in group members' behavior.

7.3 Participants

The participants in case study 1 were five Danish graduate students in library and information science. They ranged from 25 to 31 years of age, three were female and two male. The students voluntarily formed a two-person group and a three-person group, but group work was, however, also encouraged as part of a pedagogical strategy. The two male participants were in the three-person group. All participants were experienced information seekers and had previous experience with individual as well as group-based project assignments.

7.4 Work task

The work task - the project assignment - was a mandatory part of a course on systems for document and knowledge management and lasted six weeks. During this period the students had to formulate a project topic, find and digest relevant literature, collect and analyse data, devise a structure for presenting their argument, and write a project report. The project topics had to be within the broad area of knowledge and document management, but apart from that the students were free to formulate a project topic that was sufficiently narrow to fit the brief project period. The project reports approximated 25 pages for students working individually and 40-50 pages for groups.

7.5 Data collection – procedure and methods

Three weeks prior to the start of the project assignment, eight students (three groups) received a brief description of the research study and an invitation to participate (Appendix 1). The students were selected randomly from the students attending the course. All but one of the groups agreed to participate. The description of the research study emphasized that participation was voluntary and that participants were guaranteed

anonymity. Furthermore, it described what participation would entail for the students: (1) answering a questionnaire addressing demographic, assignment-, group- and information-related issues; (2) keeping a diary of tasks and information-related activities performed during the project period; and (3) being interviewed two weeks into the project, in the middle of the project and when the project report had been completed and submitted. The description of the research study contained only little information about the specific research questions the study was set up to investigate. Because of the small number of participants, the case study is only preliminary and in support of the larger case study, case study 2.

7.5.1 Questionnaire

The questionnaire (Appendix 2) helped describe the initial work task activities, create a participant profile and formed the basis of the first interview. Each participant was asked about her or his age, IT experience and previous experiences with both individual and group-based assignments. Furthermore, each participant was asked to give a brief description of the chosen project topic, which information sources had been used so far and for what reasons (e.g., for obtaining background information). Finally, each participant was asked to indicate his or her level of agreement on a 1-to-5 rating scale concerning a number of statements about information behaviour and feelings (e.g., whether he or she was feeling motivated, uncertain or frustrated).

7.5.2 Diary

The diary (Appendix 3) consisted of a *structured* two-page diary form to be completed daily by each participant during a four-week period. As a surrogate for direct observation of the participants (Wildemuth, 2002) and a way for the researcher to understand the *percieved* interplay between person and environment (Launsø & Rieper, 2005, p. 142), the diary form recorded the participants' activities, individual views and information behaviour during their work with the assignment. It combined primarily the diary log sheet used by Rieman (1993) to record activities on a daily basis and Kuhlthau´s (1993, p.82) use of journals and process surveys to record students´ actions and emotional experiences during the ISP. Instead of recording activities and experiences at three points during the seeking process (initiation, midpoint and closure) as in the study by Kuhlthau (1993, p. 96), data were recorded on a daily basis to reflect changes over time. Not only activities and experiences related to search activities were

recorded. As can be seen in Appendix 3, the participants were asked to briefly describe each assignment or *work task-related* activity carried out during the day. This could for example be *information activities* such as 'information searching', *work task activities* such as 'writing on the introduction of my report' or *group activities* such as 'met with the group'. For each recorded activity the participant should mark what kind of information sources had been used, if any, and for how long time. The *pre-coded* sources were 'printed', 'group members' and 'other persons', 'RSLIS', 'Opacs', 'Other databases', 'Web-sites' and 'Other sources'. 'Other persons' could for example be friends, family and supervisor. 'RSLIS' referred to the Royal school of Library and Information Science and implied a physical visit to the library or a visit to the homepage. 'Other databases' (beside Opacs) could be DIALOG databases and 'web-sites' could be web pages or documents found by searching the internet. 'Other sources' should be marked if none of the other categories matched the sources used by the participant. For each activity the participant was allowed to mark more sources.
Then for each recorded activity a *pre-coded* category should be assigned by the participant, which could be 'reading', 'writing', and 'searching', and further, the aim of any search activity should be specified.
Finally, each participant was asked to indicate in the diary his or her perceived emotional state by assigning each of the feelings listed at page 2 in Appendix 3 a number from 1 (low) to 5 (high), but only when recognized. These measures correspond to a large extent to Kuhlthau´s affective experiences explicated in the ISP-model and those being used in a process survey (Kuhlthau, 1993, p. 97). However, some measures have been left out or added. For example, 'confusion' in the ISP-model has been replaced by 'frustration', and 'satisfaction' has been replaced by 'relief' to reflect also the feelings associated with the research task as found in studies of students´ behaviour when writing a research paper or proposal (e.g. Kracker, 2002; Kracker & Wang, 2002; Onwuegbuzie, 1997). For the same reason 'anxiety' has been added to the list. 'Sense of direction' in the ISP-model has been addressed in the interviews by asking the participants to describe the focus of their assignment and further to elaborate on their affective experiences reported in the diaries.

Since a diary, according to Rieman (1993, p. 323), may be a burden for the participants to keep (fill out and handle), the diary form was administered *electronically* by the participants – in line with Hansen & Järvelin (2005) - and returned to the author by

email at the end of each week[56]. Instructions on how to use the diary were given to the participants a week prior to the start of the study, but only orally.
The diary was in Danish but has been translated into English for the purpose of this thesis.

7.5.3 Interviews

Three semi-structured interviews (Appendix 4) were conducted with each participant at selected stages in the lifecycle of the projects, resulting in a total of 15 interviews. Each interview lasted about 45 minutes and was recorded on tape. The interviews focused on the participants' current grasp on their projects, the activities related to the assignment process, information-related activities performed and the participants' emotional experiences. For example, the participants were asked about what kind of information sources they had been searching for and why, their use of – and reasons for using – information sources such as 'other group members', digital libraries or their project supervisor. The interviews also concerned group-related issues, such as collaboration and role allocation. By interviewing the participants individually it became possible to explore whether and how group members differed in their perception of identical situations and their information-related activities, and how these differences evolved over time. The first interview concerned the participants' goals, plans, thoughts, and feelings at the outset of their project. The second and third interview unfolded around a walkthrough of the entries in the diary concerning the period since the last interview. Hence, the interviews became concrete, detailed, and focused on the participants' information-related behaviour and activities at a specific stage of their project to be compared at the end. Furthermore, this procedure served to clarify ambiguous diary entries and ensure appropriate use of the diaries, e.g., to stress the importance of recording activities on a continually basis to minimize the risk of collecting data based on memory or rationalizations made afterwards. In the third interview the participants were also encouraged to elaborate on the utility of group based work during the project assignment, and to comment on the use of the diary, that is, whether it had affected their way of working. In addition, all interviews focused on the constructive part of the assignment process. For example, at each of the three interviews the participant was

[56] A *printed* diary would have required the students to return the diary by *snail mail* - and in a reasonable time before the next interview

asked the same question: “What is your assignment about if I ask you today?”. In this way it was expected to see some change in focus formulation over time.
Two staff supervisors were assigned to the projects. After the reports had been submitted, each supervisor was asked to indicate his or her perceived degree of focus of the reports with a number from 1 (weak) to 5 (strong) (Appendix 4). Following the studies made by Kuhlthau (1991, 1993), a positive correlation between information seeking and meaning construction was expected to be reflected in a strong degree of focus in the reports. Since the participants due to administrative conditions were allowed to choose between two types of grade system concerning the assessment of the assignment, using grades to measure the process against the outcome would not make sense.

7.6 Data analysis

The data have been analysed with the aim of describing the characteristics of group members´ activities, their cognitive and affective experiences while doing an assignment in order to see whether the behaviour of group members correspond to the behaviours explicated in the stages in the ISP-process model.

The constructive, cognitive part of the process is hard to measure, but according to Kuhlthau (1991; 1993) the participants´ topic formulations can be used as evidence to estimate the impact of information seeking activities over time. With respect to presents study, focus formulation was also expected to reflect the impact of social interactions, e.g., resulting in a shared focus by the end of the process.

The questionnaire data for each participant were registered in Excel according to the questions and opinion statements appearing in Appendix 2. Further, summaries were generated, describing the project topic and the participants’ motivations for either working alone or in groups.

The diary data for each participant were registered in Excel according to three categories: ‘activities’, ‘information sources used’ and ‘feelings’. Codes were generated representing the various response types associated with each category. Appendix 6 shows the codes used to ease the registration in Excel of participants’ recordings of

activity and employed sources. The feelings listed in the diary also constituted the codes for registration.

The interview data were transcribed and analysed in support of the three categories, but also in order to address the constructive aspect of the cognitive experiences. The interview data will be reported in support of the questionnaire and the diary data.

7.7 Data validity and reliability

During the interviews with the participants it became clear that the ‘aim of search activity’-designations in the diary were confusing and had been addressed by the participants with quite different meanings in mind. Consequently, these data have been left out of the analysis. Further, the time intervals used in the diary to record the time spent on a certain information source associated with a specific activity were not precise enough to provide any useful information. As an example, the designation ‘more than half an hour’ could be anything from half an hour to ten hours. Thus, the data on duration have been left out of the analysis as well. In addition, it turned out during the interviews that some of the participants generally changed emotionally during the day; e.g. from beeing very optimistic in the morning to less optimistic or frustrated in the evening. In some cases these participants aimed at finding an ‘average level’ of experience for the day. If, however, the participants had been required to note at what time of the day they had recorded their emotional experiences, it may have helped to nuance the data analyse.

With regards to the management of the diary, the electronically administered diaries turned out to be an obstacle to daily recording to some participants. They found that it was tiresome and time consuming to write activities down on paper during the day and then start the computer in the evening and fill out the diary. Further, when the diary is not visible, it may be easy to forget. In addition to this, two of the participants experienced technical problems during the period that impeded a proper use of the diary. However, those participants who had printed out the diary found it more easy to remember to record activities during the day. In addition, they could transcribe their handwritten recordings to the electronic diary form at a time that fitted into their plans. A slight decrease in recordings across group members were found toward the end, primarily due to the end of the assignment.

Finally, since the quality of the first 5 interviews were not very good due to technical problems, summary reports were made of the interviews in stead of a word-by-word transcription. Some important quotations or aspects may have been left out by the researcher during this process.

These limitations of case study 1 will be taken into account in the design of case study 2.

7.8 Results and discussion

This section presents and discusses the findings of the case study in relation to the three dimensions of the ISP-model: 'activities', 'cognitive experiences' and 'emotional experiences'. Further, in accordance with the structure of the research design, results are presented in relation to the 'start', the 'middle' and the 'end' of the assignment period. When referring to 'group A', it refers to the group consisting of one female (A1) and two male (A2, A3) and when referring to 'group B', it refers to the female-group (B1, B2). Participant quotations have been translated into English by the author.

The results of case study 1 will also enter into the result summaries of case study 2 as well as in the discussion in chapter 10 of the results of case study 2 and the study in general.

7.8.1 Activities during the project

Various activities associated with the task of writing an assignment were recorded by the participants in the diaries. As an example, Figures 7.1 and 7.2 show the number and variation of work task-related activities such as 'searching', 'writing' and 'reading' throughout the period, here reported by groups A and B and categorized according to the labels in the diary. The X-axis shows the dates for which these three activities have been recorded by the participants in the diary, which means that 'empty days' either did not involve 'searching' etc. or that no project task related activity had taking place on that specific day. The Y-axis shows the number of activities recorded by the group members during a day. Some of the recorded activities were categorized by the same

label, e.g. ‘searching’, which also explains why some of the patterned columns extent the number of group members.

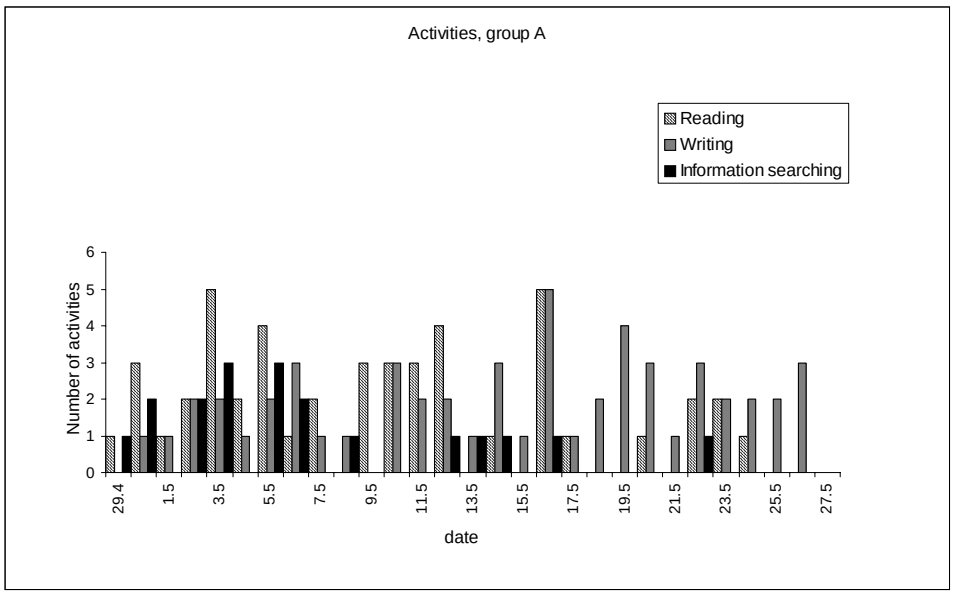

FIG. 7.1. Categorized activities during the project assignment for group ’A’.

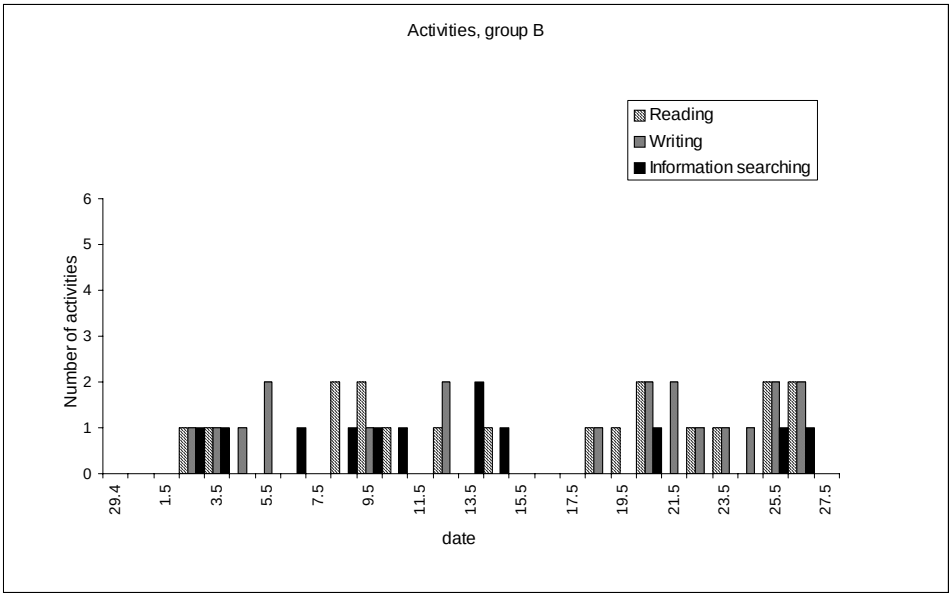

FIG. 7.2. Categorized activities during the project assignment for group ’B’.

As the figures show, reading and writing, in particular, tended to *increase* while searching *decreased* during the process. 'Information searching' generally took place in the beginning of the period (topic selection and prefocus exploration) and in the middle of the period (focus formulation) with the aim of finding background and relevant information. When searching information at the end of the project, the aim was generally to verify references. In few cases the aim was to check if relevant information had been missed, which had to be taken into account. Information searching was done on an individual basis, meaning that group members did not search information together. The strategies for seeking information differed between the participants and between intragroup members as well, for example, as demonstrated in their preferences for specific information sources. Table 7.1 shows the group members´ perceived usefulness scores from 1 (low) to 5 (high) of various information sources (at the beginning of the projeect). The shaded areas in the table show the diversity among intragroup members of the perceived importance of information sources at the beginning of the project. As can be noticed, the preferred information source(s) differed among intragroup members, indicating that the group members had different ways of seeking and getting information, also under influence of their project context.

Sources	**Group A** Scores (high=4,5)	Scores (low=0,1,2)	**Group B** Scores (high=4,5)	Scores (low=0,1,2)
Printed	A1, A2, A3		B1, B2	
Library	A1, A3			B1, B2
OPACs	A2, A3			B1, B2
Other Databases	A3	A1, A2		B1, B2
Websites	A1, A2		B2	B1
E-zines	A1, A2	A3		B1
Mailing-lists		A1, A2, A3		B1, B2
Group-members	A3		B2	
People outs.group		A2		B1, B2

TABLE 7.1. The diversity of intragroup-members´ perceived usefulness of information sources. Agreement scores: 1 (low); 5 (high).

In the diaries and the interviews, 'printed sources' and 'social sources', such as 'group members', were often mentioned in relation to three activities which took place

throughout the process: ‘reading’, ‘writing’ and ‘communication with group member(s)’.

Initially, ‘reading’ was often associated with the aim of ‘getting new knowledge’, while at the end it was more often associated with ‘checking’ and ‘controlling’ as a part of the writing process. In the same way ‘communication with group member(s)‘ varied according to the progress of the assignment. At the beginning the aim was to discuss and clarify the focus, while at the end the aim was to write the assignment with completion in mind. Accordingly, group communication turned out to form part of the *constructive* and *cognitive process* of the project assignment, which is further addressed in section 7.8.2. As indicated above, it appeared that ‘writing’ took place almost from the beginning of the assignment period before forming a focus, as opposed to the ISP-model due to which writing commonly is associated with the presentation stage (after focus formulation). Many of the participants explained during the first interviews that having started to write meant having started the project. In this way, writing formed part of both the *constructive process* of forming a focus and served as indication of how well the project was progressing. Aspects associated with the work task was also found to affect group members’ emotional experiences in terms of stress and uncertainty as the deadline approached. This is in line with Byström and Järvelin (1995), studying the relation between task types and information seeking. For example, they found that work task complexity and affective experiences seemed to be interrelated, meaning that in complex tasks, negative feelings were often arising (from the task) that became an integrated and influencing part of work task performance and information seeking. This issue on affective experiences will be further addressed in section 7.8.3 concerning the affective aspects of the assignment process.

7.8.2 Cognitive experiences during the project

Based on the questionnaire and interview data as well as the supervisors´ feedback on the assignment foci after the assignments were handed in, the group members´ formulation of subject and problem area followed to some extent the cognitive and constructive pattern of the ISP-model. This means that the group member´s formulation during the three interviews changed from weak in the beginning of the project to more focused at the end that also demonstrated a *shared* intragroup understanding of the focus. Based on the feedback from the supervisors, the assignment of group A was assigned a focus degree of ‘4’ (1=weak and 5=strong), whereas group B was assigned a fous degree of ‘3’. At the beginning, however, none of the participants, except for one,

agreed to have a clear focus of the project. In addition, the *perceived* degree of understanding of the focus varied between group-members, which further stresses the importance and need of *social* skills to ensure a qualified group communication and discussion in support of the constructive process. In addition to group communication and group discussion, group members' work task knowledge was also found to contribute to the constructive and cognitive process of the project assignment. Through group meetings and email-communication, information was exchanged and shared - either about relevant documents or through professional comments and suggestions to a group member's written manuscript. This was also done as a strategic way to ensure or provide for a shared understanding of the project focus (strategic information sharing), which corresponds to previous CIB-studies (e.g. Hertzum, 2000; Sonnenwald, 1999; Sonnenwald & Pierce, 2000).

Other *intragroup* issues turned out to affect the cognitive process as well. During the first interview it became clear that group A had problems. Each of the group members experienced difficulties in reaching a consensus of the project focus and found that the other group members had a different approach to the task. The fact that none of the members knew each other very well in advance – either professionally and/or personally - also seemed to play a considerable role in this case. In contrast, for example, the members of group B knew each other from the outset and did not experience any of these problems. In terms of the theory on group development processes presented in section 4.1.2, it seemed that group A did not really reach the fourth and 'performing' level, but stayed at the 'forming' and 'storming' level of the group development process. In turn, group B, seemed to almost 'jump' into the 'norming' and 'performing' level, which partly seemed to be a consequence of *group member familiarity*.
In addition to the impact on group members' cognitive experiences, these intra-group problems also turned out to negatively affect group members´ emotional experiences. This is further described in the next section.

7.8.3 Affective experiences during the project

Based on the diary data and the interviews, various emotional feelings were experienced during the project assignment process, varying among intragroup members both in occurrence and in strength.

At the beginning of the study when participants were asked to explain their motivations for working in a *group*, their motivations were, not surprisingly, associated with social aspects. This was reflected in statements such as: “two people are twice as good”, “I’m feeling enriched by talking to other people about various subjects”, “I’m feeling frustrated by not having other students to discuss with” or “I want to compare my level of competence with other students”.
However, when they were asked about the perceived degree of motivation for working with the *project assignment*, their answers differed significantly, which is depicted in Figure 7.3.

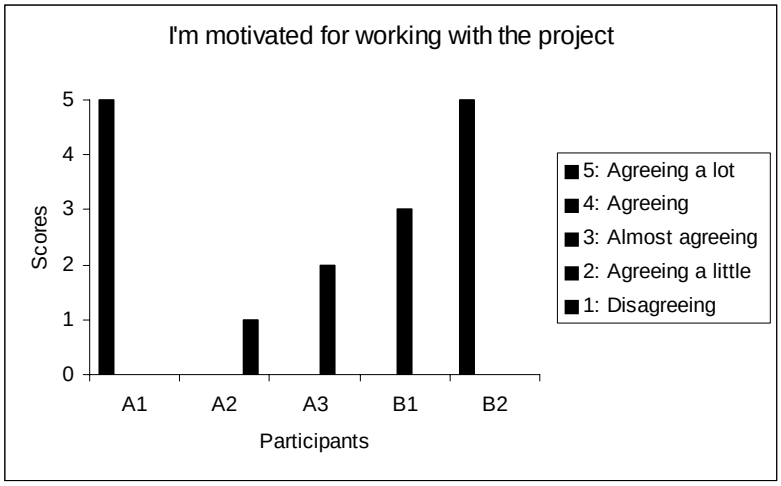

FIG. 7.3. Agreement to the 2nd statement in a questionnaire handed out in the beginning of the study. (Appendix 1): “I’m motivated for working with the project”. ‘A1-3’ refers to group A, ‘B1-2’ refers to group B. Agreement scores: 1 (low); 5 (high).

According to Byström & Jarvelin (1995), *personal* factors such as attitude, motivation and mood come into play when the information seeker is confronted with a complex task. In the same way, the diversity in motivations experienced by the group members may have affected the intragroup process. It may, for example, to some extent explain group members´ different agreements to the perception of uncertainty and frustration at the beginning of the study, as shown in Figure 7.4.

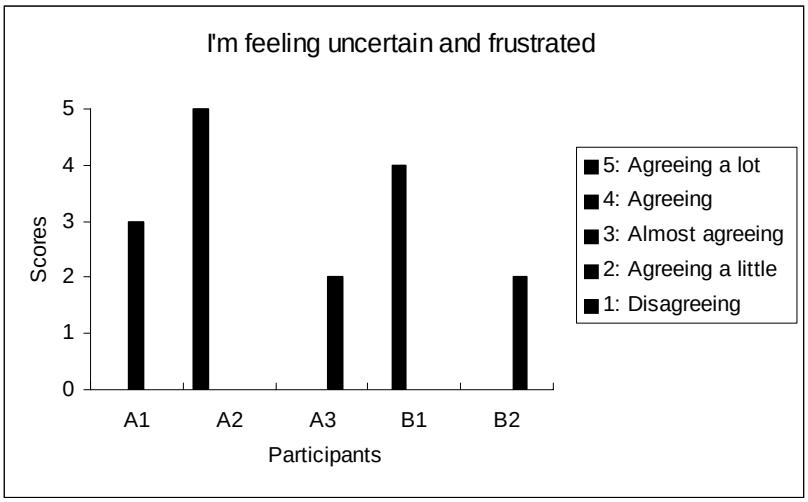

FIG. 7.4. Agreement to the 2nd statement in the questionnaire: "I'm feeling uncertain and frustrated". Agreement scores: 1 (low); 5 (high).

Following from this, 'low' to 'middle' motivation (scores=1-3) in Figure 7.3 seemed to be associated with 'middle' to 'high' uncertainty (scores=3-5) in Figure 7.4. With regard to group A, the intragroup problems (e.g. the difficulties in reaching a consensus on project focus and work task approach) - in addition to the 'familiarity'-factor - may have played a considerable role in this case. This may, for example, to some extent explain the low level of motivation and the high level of frustration and uncertainty assigned by A2 at the beginning of the study. The uncertainty experienced by group member B1 was found to be associated with a perceived "…lack of control, confidence and ownership of the assignment". This was partly due to a weak idea of the project goal and focus and partly due to a frustration caused by a feeling of not being in full control of the project and the end product. Uncertainty deriving from interpersonal and group relations are discussed by many theorists within social science (Sorrentino & Roney, 2000). Uncertainty and uncertainty reduction, for example, is here acknowledged as a major force behind behavior, which basically is associated with the need for feelings of group belongingness.

Hence, affective experiences not only derived from cognitive factors such as a weak perception of focus at the beginning of the project, but also derived from *social* factors associated with interpersonal relations in the group.

This interplay between work task processes, intragroup processes and emotional feelings was demonstrated throughout the whole process as also indicated by Figures 7.5-7.15.

Figures 7.5-7.15 show the group members' perception of negative feelings (uncertainty, frustration and disappointment) and positive feelings (clarity, optimism and relief) during the process, which in each case is indicated by a value from 1 (low) to 5 (high). The figures should not be read as the progress of one specific feeling experienced by one group member or as a sum of that specific feeling by which an average can be stated. In line with Kuhlthau´s studies, the figures signify one group member's identification and experience of a specific feeling at a certain point in the process. Thus, 'blank days' in the figures means that this specific feeling had not been recognized by the group member (except for the days where a group member did not fill out the diary). There is no figure showing the disappointment of group B, since no disappointment was recognized by the group members.

As can be seen in Figure 7.5-7.7 and Figure 7.11-7.12, negative feelings in group A and group B did not only occur in the beginning of the project. Also in the middle and at the end of the project feelings such as uncertainty, frustration and disappointment occurred.

Regarding group A, 'uncertainty' experienced by group member A1 and A2 seemed to increase, whereas A3 only seldom demonstrated feelings of uncertainty. This difference in perceived feelings among group members was also seen with regard to 'frustration' and 'disappointment'. Group member A1 primarily felt frustrated and disapponted towards the end of the assignment, which was related to an intragroup mis-match of motivations and ambitions. Group member A2 primarily felt frustrated and disappointed at the beginning and in the middel of the process, which was found to be associated with the intragroup problems concerning mis-matches in work task approach and difficulties in finding a shared focus. In contrast, group member A3 did not recognize any of these feelings at any time; he generally felt optimistic and did not seem to be emotionally affected by the intragroup problems. These differences in behavior may also be attributed to differences in personality, though not addressed specifically in this study. For example, A3 generally had a very positive and optimistic attitude towards the project, whereas A2 generally had a more anxious attitude, especially with regard to his own role in the group. A1, in contrast, had a more competitive approach, which also

was demonstrated by her experiences of frustration and disappointment as respons to situations when the project did not go in the 'right' direction or when group members did not behave according to her standards of group work.

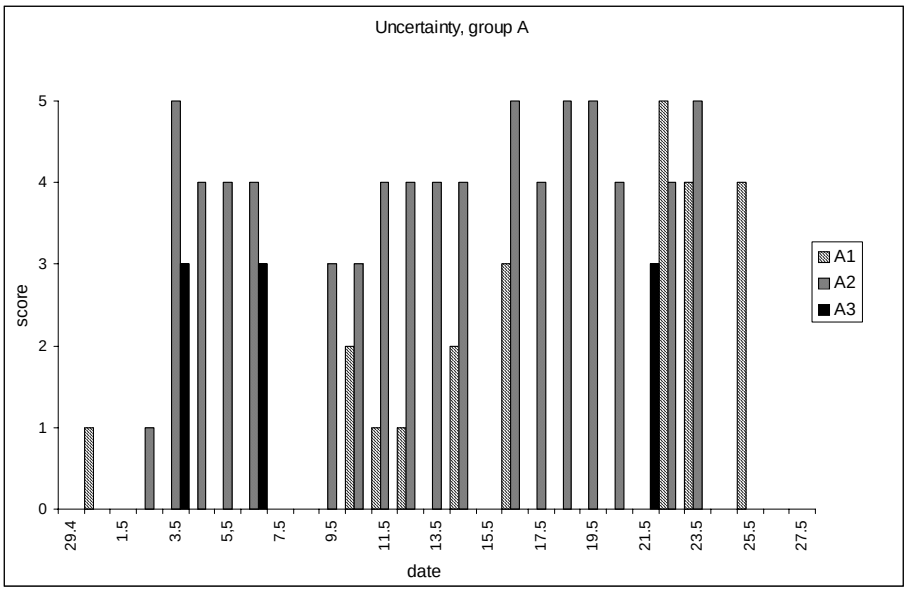

FIG. 7.5. Perceived 'uncertainty', group A.

Scores: 1 (low); 5 (high).

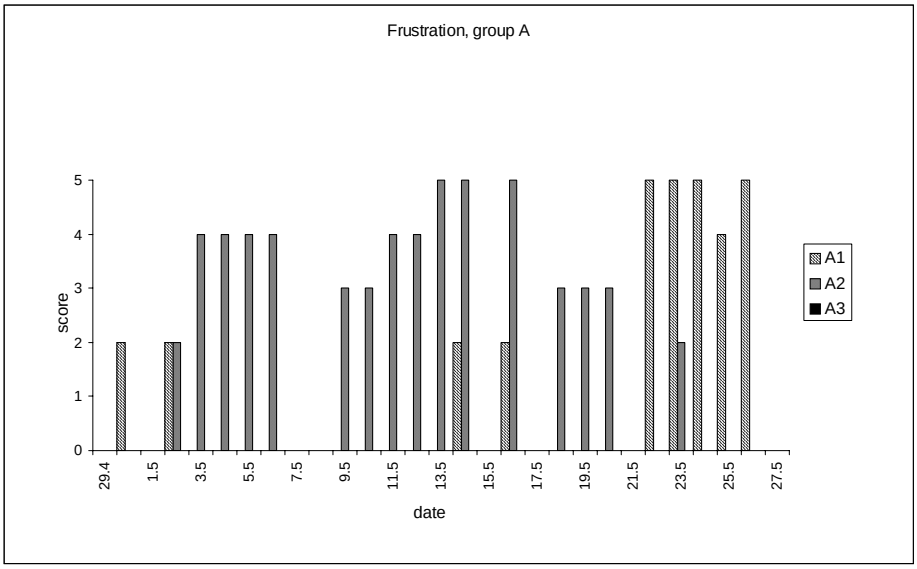

FIG. 7.6. Perceived 'frustration', group A.

Scores: 1 (low); 5 (high)

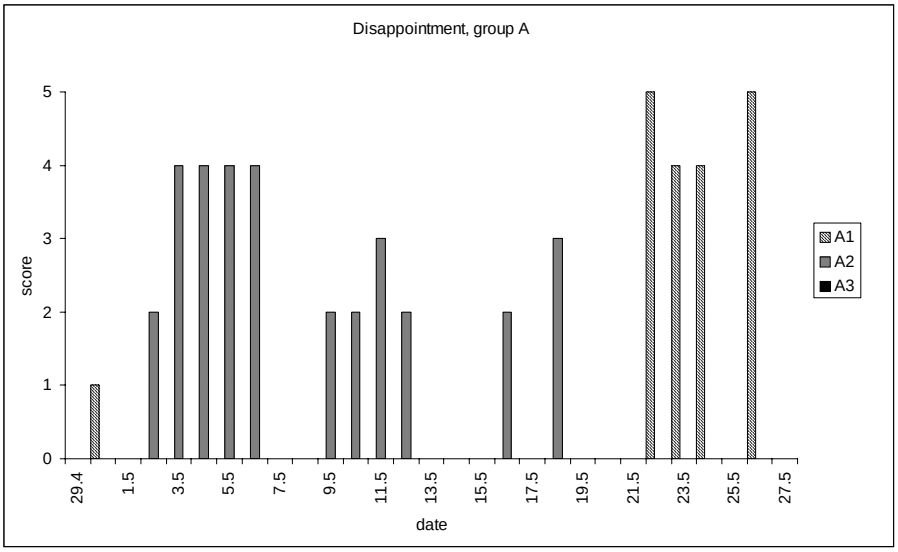

FIG. 7.7. Perceived 'disappointment', group A.

Scores: 1 (low); 5 (high)

The mis-match concerning motivation and ambition in group A was also reflected in Figure 7.8-7.10, showing the positive feelings as experienced by group A during the process. If looking at Figure 7.9, 'optimism' *increased* concerning A2 and A3, whereas optimism regarding A1 *decreased.* This corresponds with A1's increase in frustration and disappointment as stated earlier. In addition, this may also explain her experience of clarity as shown in Figure 7.8, which only was recognized at the beginning and at midpoint. In contrast, as shown in Figure 7.10, only A1 experienced a relief towards the end of the project, which was explained as a reaction to 'end of project'. A2, in turn, primarily felt relieved at the beginning and in the middle of the project. According to Figure 7.10, A3 only felt relieved a few times, which may be associated with the fact that he generally had a positive approach to the project process and almost did not experience any feelings of uncertainty, frustration and disappointment.

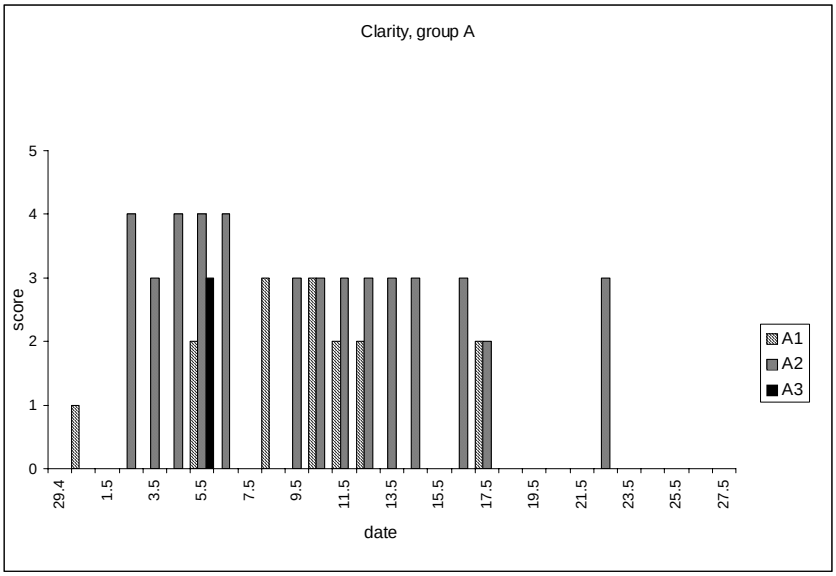

FIG. 7.8. Perceived 'clarity', group A.

Scores: 1 (low); 5 (high)

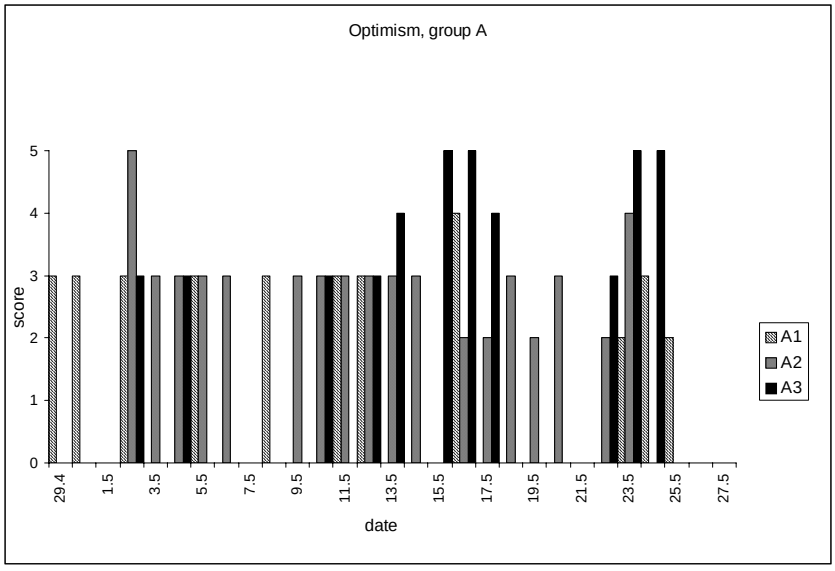

FIG. 7.9. Perceived 'optimism', group A.

Scores: 1 (low); 5 (high)

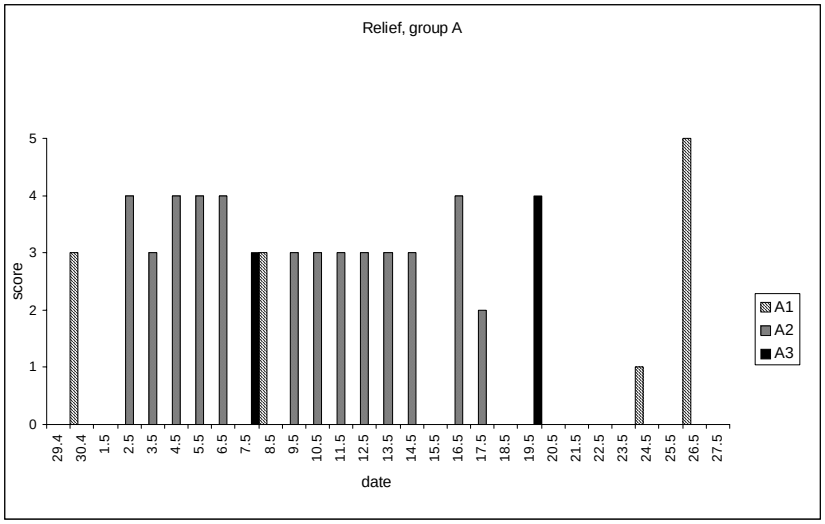

FIG. 7.10. Perceived ‘relief’, group A.

Scores: 1 (low); 5 (high)

When looking at group B, ‘uncertainty’ as perceived by group member B1 and B2 and demonstrated in Figure 7.11 diminished during the project assignment – in line with he ISP-model. However, ‘frustration’ increased with regard to B1 as shown in Figure 7.12.

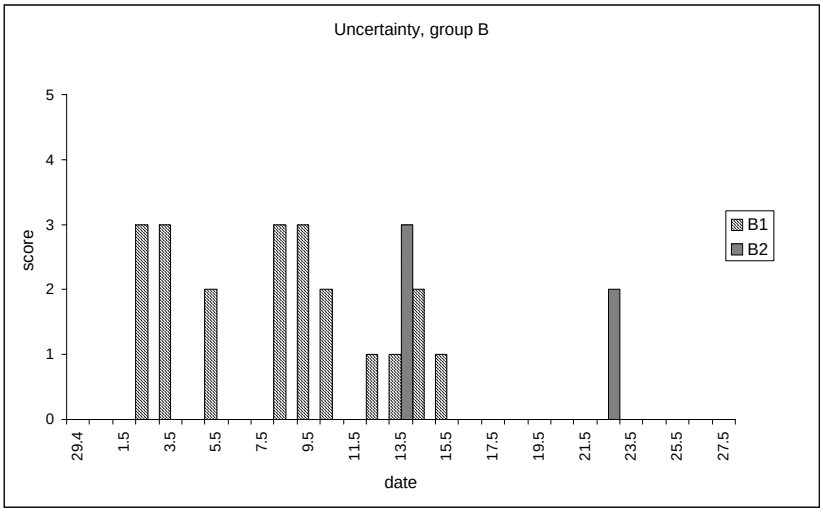

FIG. 7.11. Perceived ‘uncertainty’, group B.

Scores: 1 (low); 5 (high).

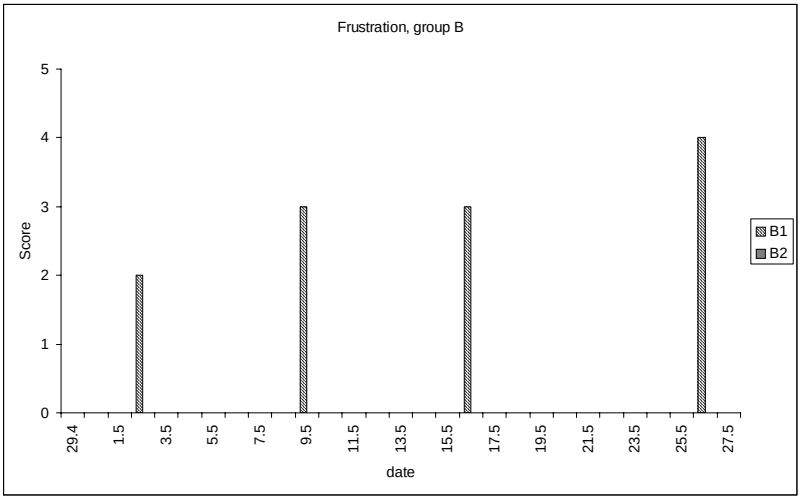

FIG. 7.12. Perceived ‘frustration’, group B.

Scores: 1 (low); 5 (high)

This was explained in the last interview to be related to the previous mentioned frustration of not being in full control of the end product and the result of the process. In contrast, no frustration was perceived by B2. She generally felt optimistic and in control with the assignment, and further, she was very happy about the group work throughout the project. This is also reflected in Figure 7.13-7.15, showing group B´s recognition of positive feelings during the project. As can be noticed, B2 generally assigned a medium score to her experiences of ‘optimism’, ‘clarity’ and ‘relief’, which she explained in the interviews were an expression of her generally positive experience of the project. Regarding B1, ‘clarity’ and ‘optimism’ increased, which tended to happen as uncertainty diminished, in accordance with the ISP-model. In contrast to B2, however, no recognition of relief was experienced by B1 at any time.

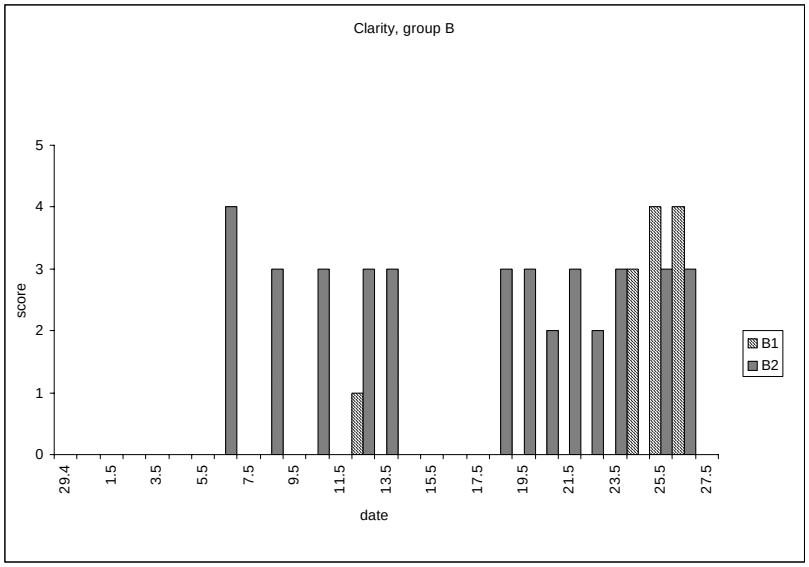

FIG. 7.13. Perceived ‘clarity’, group B.

Scores: 1 (low); 5 (high)

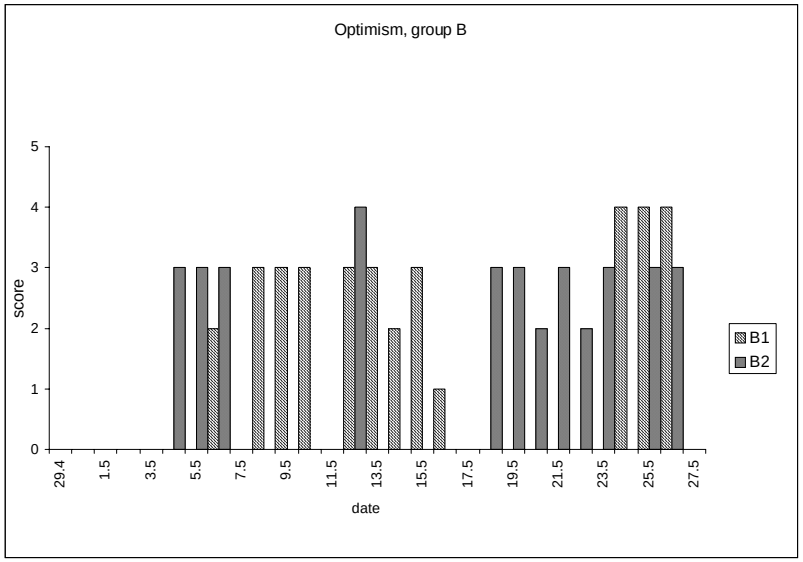

FIG. 7.14. Perceived ‘optimism’, group B.

Scores: 1 (low); 5 (high

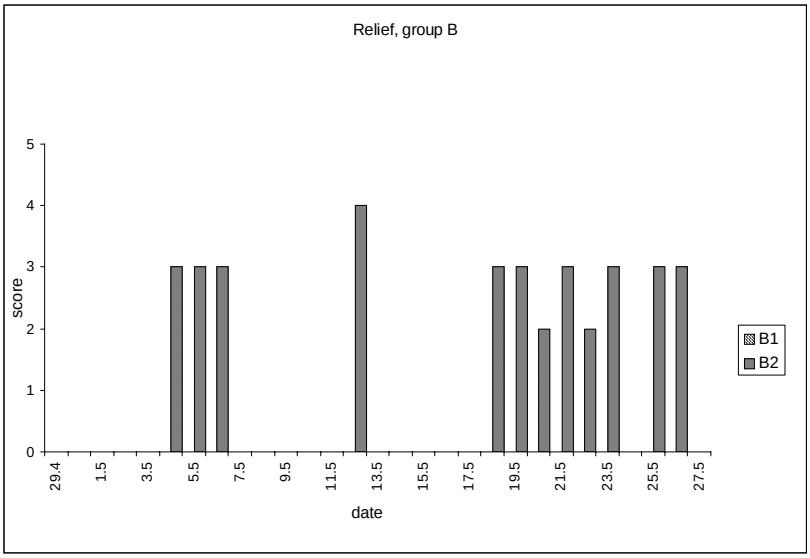

FIG. 7.15. Perceived 'relief', group B.

Scores: 1 (low); 5 (high)

Although the individual group-members' focus formulation became clearer during the process, also resulting in positive feelings as the ISP-model prescribes, it became evident in the last interview that *intragroup aspects* (e.g. divergences in motivations and ambitions between group members) had contributed to the negative feelings such as frustration and disappointment. In contrast to the ISP-model, 'uncertainty' experienced at the end of the project was often associated with the quality of the product (the assignment). Furthermore, 'stress' (as 'another feeling') noted in the diary was often related to 'lack of time', and 'relief' experienced in the end of the project was often explained by statements such as "end of stress" or "end of pressure" - and not solely by cognitive factors in response to gained clarity and focus formulation as the ISP-model states. Following from this, also characteristics of the *work task* were found to influence group members' affective experiences. These findings of the work task factor correspond well to the findings made by Kracker & Wang (2002) in their study of students´ anxiety in relation to research. 'Research anxiety' was here found to be more than library anxiety; anxiety was for example associated with the start of research, information collection and writing, in addition to overall aspects, such as time management. Further, 'relief' was found to be associated with the research task, that is, the accomplishment of the assignment (Kracker & Wang, 2002, p. 298).

7.8.4 Summary of results

With regard to research question 1, the findings of case study 1 showed that group members *cognitive experiences* changed towards a more clearer focus towards the end – in line with the ISP-model. However, the information seeking process did not always result in positive affective experiences proportional to the process of cognition, simply because other work task or group related factors were at play too and intermingled with group members' affective experiences. Compared to the individual´s experiences in the ISP-model, the negative feelings *did not* necessarily diminish as the project focus became clearer and the group members stopped searching for relevant information. In addition, the negative feelings were *not replaced* by positive feelings such as clarity, also mentioned by Kuhlthau as the 'turning point'. Further, the mandatory deadline of the project *did not* match group members' level of ambition and sense of 'project finish' or 'closure'. The impact from the group process was further demonstrated during the last interview. All group members, except for one, said that they would prefer to continue on an individual basis if they had the chance to correct parts of the project.

Compared to the ISP-model, one may argue then that to some group members, the only stage reached was the Kuhlthau stage 3 ('frustration/doubt', prior to a narrower focus formulation and 'clarity') as perceived by *them*. Though a clearer focus (in their writing) was detected towards the end, *they* did not feel it that way. Though the information seeking process had stopped (Kuhlthau´s stage six), generally expected to imply relief and satisfaction according to the ISP-model, some of the group members still felt uncertain and frustrated at the end of the project. This may indicate that the participants did not go through all the stages of the ISP-model. In addition to this, it may further be argued that one group (group A) due to intragroup conflicts did not fully reach the *performing stage*, but stayed at the storming/norming stage throughout the process.

Regarding the intra-group behaviour in research question 2, the group members applied different information seeking strategies, for example as shown in their different preferences for information sources. This may also have affected the goal of reaching a shared understanding of the focus and project goal. Further, the feelings experienced by each group member varied during the project assignment, both in type and strength. This variation may also be related to personality factors, though not addressed specifically in this study. A divergence in group members' focus formulation,

motivation and ambition was also identified, which often were associated with feelings of uncertainty, frustration and disappointment. To sum up on the last research question, social and collaborative factors were found to affect group members´ cognitive and affective experiences; however, they did not assimilate but still perceived and acted on an individual basis.

7.9 Conclusions of case study 1

The aim of case study 1 was to contribute to our understanding of the impact of socially determined work task activities on information (seeking) behaviour as experienced by group members in a collaborative setting. Though only preliminary in its form, some findings can be stated that need to be further explored.

Not only information seeking activities, but also activities associated with the work task and group work seemed to dynamically affect the outcome of the process, cognitively as well as emotionally.

Different intra-group preferences concerning information sources were observed which seemed to influence the goal of reaching a shared understanding of the focus and project goal. Further, the intragroup divergence in foci, motivations and ambitions turned out to contribute to feelings of uncertainty, frustration and disappointment. Though the information seeking process had stopped (Kuhlthau´s stage six), generally expected to imply relief and satisfaction according to the ISP-model, some of the group members still felt uncertain and frustrated at the end of the project. This may indicate that the participants did not go through all the stages of the ISP-model. In addition to this, the intragroup problems taking place in one group throughout the process may indicate that this group stayed at the storming/norming group development stage and never reached the final and performing stage. A similar finding was made by Kuhlthau (2004) in one of her studies, indicating that some students may enter the presentation stage without having formulated a clear focus, hence have not passed through all the stages of the ISP-model.

The result of the study has lead to the following conclusion:

- Based on group members´ focus formulation at the beginning, midpoint and end of the process they did to some extent demonstrate similar *cognitive experiences* as those presented in the ISP-model. However, this formulation was not only based on information searching but also based on activities such as social interaction during group work, and reading and writing. In addition, cognitive experiences also seemed to interact strongly with the group members´ emotional experiences during work task performance. Concerning group members' *emotional expriences*, they did not perceive similar emotional experiences as the individual information seeker in the ISP-model; uncertainty and disappointment was still perceived by some group members at the end of the project period, which to some extent was related to social and work task factors associated with intragroup mis-matches regarding motivations, ambitions and project foci. This may also indicate that these group members only reached stage three in the ISP-model. In addition to this, the intragroup conflicts arising in one of the groups may further indicate that this group only reached the storming/norming group development stage of the group development process.

- Group members did not demonstrate similar intragroup characteristics and behaviours during the process and thus cannot be regarded as 'an individual', just in another sense.

Taken into consideration that group members in this study were found to possess very different affective experiences during the project assignment - some of which tended to be both socially and personally determined - it may be hypothesized that the work task and its effect on students' performance is *even* more complicated when the task is solved in a group based setting.

Based on the results derived from case study 1, two research interests have been identified that should guide the design of case study 2:

1. To further explore the '*group member-in-situation*' behaviour, meaning how group members' information behavior compare to the individual in the ISP-model and, further, if and how intra-group members' behavior differ from each other.

2. To gain insight into the *complexity* of group-based information behaviour and problem solving, meaning that factors associated with the work task and group work processes should be further explored. In addition, as personality also seemed to interfer with group members' affective experiences, the study of the dynamics and interaction between individual and social contexts (here used in a general sense) may also benefit from taking personality characteristics into account. These considerations are further described in the next section concerning the methodological reflections of the study and in chapter 8 of the design of case study 2.
In addition to the results from case study 1, case study 2 will also be guided by the methodological reflections derived from the study and presented below.

7.10 Methodological reflections

The methodological reflections based on case study 1 primarily regards the design and use of the diary and the relevance of personality in the study of group members' information behaviour.

As already mentioned in section 7.7, some of the designations associated with 'aim of search activity' in the *diary* were not clear to the participants and had been interpreted with different meanings in mind. In addition, the time interval used to mark the time spent on various information sources had been too large to generate useful data.
The interviews revealed also that the time for filling out the diary should have been noted, since mood turned out to differ during the day for some of the participants, affecting the recording of emotional experiences accordingly.

The use of the diary was futher explored in the last interview, where the participants were asked about their experiences due to their participation in the case study and were invited to comment on the use of the diary as well.

The participants generally found that the two-page format was acceptable, but that the electronic diary was tiresome, affecting the span between event and registration negatively. Instead, a printed diary was suggested – one for each day and all collected in a binder. As mentioned in the literature (e.g. Rieman, 1993; Wang, 1999), the use of diaries may be a tedious and time consuming way of collecting data compared to other methods. Therefore, *feasibility* and *ease of use* is very important in relation to the design

of diaries to limit the risk of getting data based on memory and participants who 'forget' to record data on a daily basis. Despite the constraints resulting from the electronic diary form, the diary period of four weeks was, however, accepted.
According to Rieman (1993), periods of no more than 14 days at a stretch are generally recommended to qualify the collection of data. Hence, a shorter diary period may had encouraged the daily recording of data. In addition to this, motivating participants to cooperate is very important to succeed, since over time participants may become sensitive to the process and modify their behavior, e.g. by recording more content initially which tails off toward the end of the diary period (Corti, 1993; Verbugge, 1980). The slight decrease in recordings across group members in case study 1 may be associated with lack of motivation, but may as well be a result of an increase in work load due to the ending of the assignment.

Concerning the *design of the diary*, the structured form with closed and pre-coded response categories complied with the request for feasibility and ease of use but may, however, also have discouraged the free generation of open text usually associated with the diary genre. For example, it turned out that the use of pre-coded affected the way participants *thought* of their activities, and hence, *described* their activities in the diary. These findings are similar to the participants' use of generic terms in a diary study by Czerwinski, Horvitz & Wilhite (2004, p. 2).

Another aspect of the diary usage relates to the type of *content* that was recorded. Since the participants had been encouraged to record observable activities associated with group work, the work task product and information seeking, mental activities, such as the participants' reflections and cognitive experiences, did only rarely enter into the diaries, as this comment from A2 indicates: "… the diary do not show all the project related activities taking place during a day…a great deal is going on in the head" (Interview2, A2).

Hence, diary data were primarily *activity* data. This stresses, however, the importance of the interview method to triangulate the exploration of information behavior, in line with Toms & Duff (2002). In this respect, the diary-method served as a guide for the interviews when deciding which issues to address and when referring to specific incidents during the interviews.

Besides to serve as a methodological tool, the diary method turned out to serve also as an instrument for some of the participants' own reflection and learning about their working process. In addition, some of the participants used the diary as a project management tool reflecting how well the project was proceeding.

Some of the methodological problems stated above in relation to the employment of the diary may had been avoided if the diary had been pilot tested in context prior to the official start of the study - either by some impartial subjects in order to correct the design or by all participants of the study to limit the risk of misconceptions as well as to train the participants in using the diary.

Though not addressed specifically in case study 1, *personal factors* also seemed to affect group members' behaviour, that is, how the individual group member was thinking, feeling and behaving. This was, for example, seen in group A, where A3 generally had a very positive and optimistic attitude towards the project, whereas A2 generally had a more anxious attitude, especially with regard to his own role in the group. A1, in contrast, had a more competitive approach, which also was demonstrated by her experiences of frustration and disappointment as respons to situations when the project did not go in the 'right' direction or when group members did not behave according to her standards of group work. In line with Allen (1997), personal variables interact in generating information related behavior and forms part of the *complexity* of the 'person-in-situ'-perspective. Transferred to the group setting, insight into personal characteristics may further help clarify group members' information behaviour during a project assignment and the dynamics between the individual and group level of behavior. As presented in chapter 5, however, 'personality' should only be hypothetically understood, meaning that it denotes a *tendency* to behave and react in a specific way dependent on the specific situation. Hence, dependent on the situation, personality traits may be more or less visible. For example, persons characterized by high emotional instability are more likely to feel anxiety in a threatening evaluation situation than calm and stable persons. Personality states and behavior therefore should be regarded as the result of personality traits *combined* with the situation.

8 Case study 2

This chapter presents the research design of case study 2, that is, the research focus, the participants, the work task and the methodological framework. This study is based on the results and experiences gained from case study 1 concerning Kuhlthau's ISP-model in a group based setting. In addition, a preliminary investigation of students' perception of constraints to group work prior to the study has contributed to the reseach design as well as to the discusssion of results. The results from case study 2 are presented in a separate chapter, chapter 9, taking into account also the results from case study 1. Relevant themes derived from the result presentation will be discussed in chapter 10.

8.1 Preliminary investigation of students´ perception of constraints to group work

To get some impression of students´ perception of group work prior to the design of case study 2, fifty-five (55) students at the bachelor level (fourth semester)[57] at the Royal School of Library and Information Science were asked two questions regarding group work: 1) What do you think is the most difficult about group work? and 2) What do you want to be better at regarding group work? This session took place in spring 2004 as part of a meeting on problem based project work. All answers to question 1 were given on blue paper, and the answers to question 2 were given on red paper. For the purpose of the present research focus, only the answers to the first question have been taken into account. The analysis of the 55 answers to question 1 resulted in four broad categories of constraints associated with group work: 1) Group member similarities and divergences 2) Collaboration issues, e.g group disciplin 3) Individual/personal issues and 4) The form of group work, meaning group work versus working individually. Table 8.1 shows the four categories and examples of the associated constraints to group work as reflected in the answers. Furthermore, the number of occurences (answers) within each category is given. Since more answers were allowed, the number exceeds 55.

[57] These students were the same students who later on were invited to participate in case study 2

CATEGORY	CONSTRAINTS	NUMBER
Group member similarities and divergences	E.g. different intragroup ambitions, engagement, qualifications, perceptions of the goal, expectations to the product and the process, work moral, speed of work, form of work, temper	22
Collaboration issues	E.g. none or little preparation from group members, group members who come too late, difficult to divide the responsibility, can be difficult to keep focus in a group, difficult when some are lazy, group members who don't respect others' work, lack of respect between group members	14
Individual/personal issues	E.g. hard to concentrate for a long time, hard to compromise, hard to stay patient, difficult to divide responsibility to others,, uncertainty with new group members, some group members are dominant or accept being dominated, thus keep their opinions back. When other group members get impatient with me, when other group members approach the subject differently from me	26
Form of group work	E.g. group work is time consuming, in-effectively, hard to coordinate meetings and appointments, too many members in a group, difficult to keep a good balance between leisure and work, difficult to work in ones own pace	13

TABLE 8.1. Students' perceptions of constraints to group work (N=55).

Since more answers were allowed from each, the number exceeds 55.

As it can be noticed, *individual/personal* aspects as well as *group member divergences* seem to be the weighty constraints to group work among the 55 students asked. According to the theory on group work as well as the result from case study 1, the constraints can be seen as inherent characteristics of group work, independent of the specific domain or context in focus. However, the *perception* of group constraints and the reaction to these may vary according to personal factors as well as to the type of context and work task. The data from this study, though small, will help form the design and analysis of case study 2.

8.2 Design of the study

Case study 2 was carried out from October 2004 to January 2005 and followed three groups of information science students during the process of making a term project assignment. During a twelve-week period, each group member participated in a personality test, filled out a demograhic survey and three process-surveys as well as kept three one week diaries of his or her activities and information-related behaviour. In addition, each group member was interviewed three times each during the period based on questions in an interview guide and on his or her statements in the process surveys and the diaries.

8.3 Research focus and research questions

The aim of case study 2 has been to further explore the impact of *work task* and *social factors* on the individual group member´s activities and his cognitive and affective experiences. In addition to this, *personal factors* have been taken into account in this study, as group members' behaviour in case study 1 also seemed to be related to personal characteristics (how the *individual* think, feels and behave).

As mentioned in chapter 5 of personality, many studies have addressed the psychological factors in information seeking behaviour (e.g. Wilson, 1999; Kuhlthau, 1993, Solomon, 1997a;1997b). According to Solomon (1997a;1997b) information seekers are characterised by typical patterns of affective responses which differ from each other in the intensity of their reactions. These differences have been further investigated by Heinström (2002) in her recent study of the relation between 350 university students´ personality traits and their information behaviour, which was based on the ISP-model[58]. As the study showed, variations in information behaviour could be connected to different personality dimensions, hereby illustrating also how *person* dependent the information seeking process is. Transferred to case study 2, integrating the personality factor in the research design is in line with Allen's (1997) conceptualization of 'person-in-situation' information behavior, which emphasizes the dynamics between individual (personal) and group (social). Accordingly, the aim is to strengthen the research design by addressing more specifically also the personal aspect, hence providing a better grounding for discussing 1) differences and similarities between group members' activities and cognitive and affective experiences and 2) the dynamics between personal, social and contextual factors. As stated by Allen (1996; 1997) an integrated approach to reseach also implies a much more complex research design. Besides the positive expectations regarding the analytical part of the study, it may as well imply that factors will be difficult to control. The constraints deriving from that will be sought minimized during the design and employments of specific data collection methods.

[58] The personality factor was not addressed by Kuhlthau in her investigation of individuals' information seeking process. However, the study by Heinström (2002), building on the ISP-model, seems to confirm that 'personality' influences on individuals' information seeking behavior (activities and experiences) along with the various stages of the model.

Based on the results from case study 1, the research questions have been modified into five research questions which address two main research interests: 1) group member behavior and 2) factors affecting group member behaviour. Research interest 1 consists of two research questions (1a-1b) and research interest 2 consists of three reseach questions (2a-2c) , which are presented below.

To explore the impact of *social and contextual factors* on group members' information behaviour, the *information behavior* of the individual group member should initially be mapped and compared with the information behavior of individuals in the ISP-model:

1a. Will group members behave differently from the individual modeled in the ISP-model? If so, in which way do they behave and why?

Associated with an affirmative answer to question 1, it may turn out that the behavior of group members either differs or tends to assimilate during time. If the lattter is the case, we may then speak of the group as an entity or another kind of individual in its own right. This leads to the second research question:

1b. Will intragroup-members demonstrate different activities and cognitive and emotional experiences? If so, in which way do they differ and why?

The next three research questions regard the *factors* associated with group members' information behaviour, which in this context refer to contextual, social and individual factors:

2a. How is group member behavior related to contextual factors (work task)?

2b. How is group member behavior related to social factors (group work)?

2c. How is group member behaviour related to individual factors (personality)?

8.4 Participants

The participants in case study 2 were ten Danish graduate students in library and information science studying at their fifth semester. At this level the curriculum is

dedicated to problem based project work and group work accordingly. The students followed two courses, one with internal exam (A-courses) and one with external exam (B-courses). At both courses, the students are required to make an assignment; however, at the A-course the assignment could vary in its forms whereas at the B-courses the form was the same, besides the variations of subjects. To control the study, groups from type B-courses (seven courses in total) were selected. Ten students from two B-courses within cultural studies agreed to participate. They ranged from 23 to 48 years of age, nine were female and one was male. The students voluntarily formed two three-person groups and one four-person group, but as with case study 1, group work was welcomed as part of a pedagogical strategy. The male participant was in the four-person group.
As shown in Appendix 17 (number 4-6A; 8-9), participants were experienced information seekers (from some to wide) and had previous experience with group based project assignments. Most of the participants had previous experience with individual based project assignments as well.

8.5 Work task

The work task - the project assignment - was a mandatory part of the B-courses, which covered various subjects, such as cultural heritage studies, children's' literature, music mediation and bibliometric studies. The project period lasted fourteen weeks, from week 41 2004 to week 01 2005. During this period the students had to formulate a problem within a specific project topic, explore the topic and find a focus, find and digest relevant literature, collect and analyse data, devise a structure for presenting their argument and finally write a project report. The project reports approximated 15 pages for students working individually and 30-40 pages for groups of students.

8.6 Data collection – procedure and methods

To recruit participants an email describing the project was published on the students' intranet. In addition, the involved teachers were contacted regarding an introduction to the project in class. The only condition layed down was that the participants had to be group members. As motivation, the participants were promised a fee (600 Danish kr.) and a test of their personality that might be used in relation to job application – besides the knowledge they would gain about group processes in general. The participants were

ensured full anonymity. Two weeks after the introduction in class, three groups of students (ten students in all) had declared their interest and willingness to participate in the study. They were given a thorough two-hour introduction and guidance to the study and the implied data collection methods. All participants signed a consent of participation. In the end of the introduction each group member participated in a personality test, which was instrued by professor Niels Ole Pors, who had been certified to conduct personality tests. To facilitate the data collection process and the quality of data, a ring binder was handed out to each participant at the introduction containing all relevant material to be used in the study: administrative content, including an introduction to the study and conditions for participation (Appendix 7), a consent of participation to be signed (Appendix 8) and a time schedule showing which activities to be done at what time during the process. In this way, they could easily see when to fill out and hand in a process-survey or to start a diary period or to participate in an interview. This was also followed up by a reminder on email before each data collection point in the process: at start, middle and end. The binder also contained various data collection forms, such as one demographic questionnaire, three process-surveys and three diary forms to be handed in at selected points in the process. The data collection forms were also sent to the participants by email if some of them preferred to hand in the forms electronically. However, only the printed material were used by the participants.

Case study 2 has primarily been based on *qualitative* methods to collect data on group members´ physical activities (as related to group work, work task and information behaviour) and of their emotional and cognitive experiences. The methods concentrated on participants' perceptions and experiences as reflected in utterances, descriptions, stories and explanations. For this purpose, three methods were selected for data collection: *questionnaires* (demographic questionnaire, personality-test and process surveys), *diaries* and *interviews*. The data have been collected at three points in the process*: start*, *middle* and *end.* The personality test and demographic questionnaire were handed out in the beginning of the study. The process survey was handed out at the three selected points in the process, each time followed up by a 7-days diary period and an interview. After the assignment had been handed in, the supervisors were asked to indicate their perception of focus. After the end of the data collection period, all participants and participating colleagues were invited to a reception as an acknowledgement of their support and to close the study. Each data collection method is described in detail below.

8.6.1 Questionnaires

8.6.1.1 Demographic questionnaire

The demographic questionnaire as shown in Appendix 9 consisted of twenty-three questions and statements. The aim was to collect profile data on each participants in terms of personal information, such as gender and age, as well as information related to prior experience in terms of group work, the subject of interest, IT and information seeking. In addition, issues regarding attitudes and behaviour in relation to information seeking were also addressed to qualify the discussion of personality and information seeking. Thirteen statements regarding information seeking behaviour in general were formulated (number 11-23), addressing one or more personality dimensions, in line with Heinström (2002). Table 8.2 shows the personality dimensions associated with each statement. As indicated in the personality column, however, a clear relation between statement and personality dimension may be difficult to make. Sometimes the behaviour is associated with various personality dimensions, at other times it may be dependent on the specific context of use or both. Statement number 18 for example, *'I prefer documents that are easily accessible on the Internet'*, may be an aspect of agreeableness but may also be an aspect of an professional identity, generally preferring electronic resources to printed ones.

Statement	**Personality dimension**
11	Neuroticism
12	Openness to experience
13	Openness to experience
14	Openness to experience, conscientiousness, context dependent
15	Extraversion
16	Openness to experience, agreeableness,
17	Conscientiousness
18	Agreeableness, context dependent
19	Agreeableness
20-22	Context dependent
23	Agreeableness

TABLE 8.2. Information seeking statements and their associated personality dimension(s) in the demographic survey.

The replies to the thirteen statements were given in a form similar to the Likert scale. With a value from '1' (disagreeing) to '5' (strongly agreeing), each participant was

asked to state his or her agreement to each of the thirteen statements in the questionnaire. Regarding the demographic questionnaire in general, pre-defined response-categories had been assigned to each question and statement (except for question 1-3). In addition, each response-category had been assigned a number in preparation for the data analysis.

8.6.1.2 Personality test

To get an indication of each participant's type of personality, a personality test was conducted at the beginning of the study. The personality test used is named the Revised NEO Personality Inventory (NEO PI-R)[59]. It is based on the five-factor model of personality (Costa & McCrae, 1992) which addresses or measures five core and durable traits in normal personality: *Neuroticism*, *Extraversion*, *Openness to experience*, *Agreeableness* and *Conscientiousness*. Each factor in the test is a summarization of six traits or *facets* that also are measured by the test. Neuroticism, for example, is a summarization of 'anxiety', 'temper', 'pessimism', 'social fear', 'impulsiveness' and 'nervous'. Thus, a person may be described both at a general level and at a more specific and distinctive level. When comparing personalities across individuals, this also means that the same score given at the general level may in fact conceal very different personality structures at the detailed level and different type of behaviours accordingly. The personality test itself consists of 240 statements given in a questionnaire to which the test person shall indicate his or her agreement on a scale from 'strongly agreeing' to 'strongly disagreeing'. The data from the NEO-PI-R test is then tapped into a computer program which results in various calculated scores on factors and facets.

Many approaches and traditions to measure personality have been developed. However, the Five-Factor model or the 'Big Five', as it is called also in literature, synthesises and integrates previous empirical research traditions on personality and is thus based on a solid empirical foundation. Today, a considerable part of empirical personality research is either based directly on the model or indirectly by referring to the model. In this way, empirical knowledge continues to grow which again has a self-perpetuating impact on

[59] NEO-PI-R refers to the revised version from 1990. The first version originate from 1985. The NEO-PI-R questionnaire used in the study was the Danish translation. It has been tested with 1000 Danes in various settings to ensure congruence with the English version (Skovdahl Hansen & Mortensen, 2003)

researchers' choice of the five-factor model to studying personality (Skovdahl Hansen & Mortensen, 2003).

The NEO PI-R test is one of the most widespread test based on the Five-Factor model (Skovdahl Hansen & Mortensen, 2003). The empirical work done by Paul T. Costa and Robert R. McCrae (e.g. Costa & McCrae, 1997) is one explanation; another is the construction of the test itself. Besides allowing for both a general and detailed description of personality, the test is also build up in such a way that it takes into consideration the characteristics of the specific test-person in focus. Specific norms for groups of people and profiles have been developed from research to help validate the test-result. For example, norms exist for age, job and for students. In this way, test-persons are always compared to people from the same group when test data is analyzed.

The five factors have already been introduced in chapter 5, but for the purpose of presenting the personality test, each of them *and* their associating facets is presented below:

Neuroticism or (inversely) *Emotional Stability*
Describes a tendency to worry. People who score low on this factor are usually calm, relaxed and rational and may sometimes be perceived as lazy and incapable of taking things seriously. People who score high on this factor are alert, anxious, sometimes worried. Associating facets to neuroticism are 'anxiety', 'temper', 'pessimism', 'social fear', 'impulsiveness' and 'nervous'.

Extraversion
Describes how 'energetic' one is. People who score high on this factor like to work in cooperation with others, are talkative, enthusiastic and seek excitement. People who score low on this factor prefer to work alone, and can be perceived as cold, difficult to understand, even a bit eccentric. Associating facets to extraversion are ' warm', 'social', 'dominating', 'level of activity', 'seeking excitement' and 'positive emotions'.

Openness to Experience or *Openness to Ideas*
Describes a tendency to be reflective and imaginative. People who score high on this factor are curious towards their inner and outer world, such as emotional experiences and new and unconventional ideas. Their life is often rich on experiences. Open people

are also more sensitive to negative and positive feelings than closed people. They may sometimes be unrealistic in their approach to life. People who score low on this factor are down-to-earth and practical and sometimes obstructive of change.
When conflicts are due to differences in personality, it is usually due to differences in openness to experience. Associating facets to openness to experience are 'imaginative', 'aesthetic', 'emotional deep', 'experimental', intellectual curious' and 'tolerance'.

Agreeableness
Describes one's level of orientation towards other people. Those who score high on this factor are usually co-operative, can be submissive, and are concerned with the well-being of others. People who score low on this factor may be challenging, competitive, sometimes even argumentative.
Agreeableness and extraversion are also known as the two 'social' factors. Associating facets to agreeableness are 'trustful', 'sincerity', 'charity', 'indulgence', 'modesty' and 'sympathy'.

Conscientiousness
Describes how 'structured' one is. People who score high on this factor are usually productive and disciplined and 'single tasking'. People who score low on this factor are often less structured, less productive, but can be more flexible, inventive, and capable of multitasking. Associating facets to conscientiousness are 'feeling of competence', 'orderliness', feeling of responsibility', 'performance focus', 'self-discipline' and 'steadiness'.

The underlying assumption behind the five-factor model - and the NEO-PI-R test - is that personality traits to a certain degree correspond to one's behaviour. However, the analysis of test data should be made with some caution. For example, the Five-Factor model relies on self report questionnaires to be measured. When considering differences in scores across individuals then, we cannot be quite sure whether the scores represent genuine underlying personality differences, or whether the scores have been affected by the way the subjects answered the questions. Further, concepts may be perceived differently across time and even across individuals due to previous experience and background. This may imply various positive and negative reactions from subjects which again may affect the scoring. In addition, personality traits cannot be deemed to be either positive or negative but rather positive in one situation and negative in another.

For example, a very low score on extraversion may be negative in relation to group work but positive in relation to students writing an assignment on an individual basis. Therefore, it may not be reasonable to classify subjects into absolute terms of personality, but instead regard subjects' personality traits as *tendencies of behavior* in accordance with specific situations or contexts, as suggested in chapter 5. This 'soft' approach to personality also implies that we cannot determine with certainty to what extent influence from personality on information behavior will differ between a group and a non-group setting.

With regard to the present study, the long version of NEO-PI-R (factors and facets) has been employed to describe each group member at a more detailed level. In Heinström's (2002) quantitative study of students' personality, the short version was employed to describe and compare personality traits at a general level. Other personality tests exist that focus specifically on groups, e.g. the Belbin test[60]. Besides the methodological explanations given above, however, the focus is here on groups in academic settings, not on teams in organisations. Further, a recent study (Fisher; Hunter & MacRosson, 2001) has demonstrated that the five factor-model on which the NEO-PI-R test is based also holds for the team-roles resulting from the Belbin-test. In addition, the NEO-PI-R personality test has been used recently in a a study (Heinström, 2002) based on the ISP-model investigating the relation between students' personality and information seeking behavior. Finally, the NEO-PI-R personality test was practically possible to conduct as the software and personnel certified for conducting these tests were available at the Royal school of Library and Information Science.

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[60] The Belbin test has been developed by Meredith Belbin and his team of researchers at Henley Management College in England. During 9 years of research they studied the behaviour of managers from all over the world. Managers taking part in the study were given a battery of psychometric tests and put into teams of varying composition, while they were engaged in a complex management exercise. Their different core personality traits, intellectual styles and behaviours were assessed during the exercise. As time progressed different clusters of behaviour (team roles) were identified as underlying the success of the teams. The test developed from this research focuses on the identification of different team roles – not only based on mangers' self-reportings, but a consensus estimation of obeserved behavior in the team. The Belbin test is used today in many organizations all over the world, e.g. when putting teams together or when finding the right person for at given job (http://www.belbin.com).

Professor Niels Ole Pors gave at start a short introduction to the personality test and its use. Then the participants filled in the questionnaire and handed it in to the author immediately after the test. When the data had been registered and reports of the test result had been made, the participants were given a copy of the test result and invited to participate in a debriefing interview with Niels Ole Pors for further discussion and feedback. The participants were also invited to comment on their test experiences as part of the third interview in the case study.

8.6.1.3 Process survey

To elicit process and activity data associated with information seeking as well as the project assignment and group work over time, a printed process survey should be filled out and handed in at three selected points (dates) in the process: start, mid-point and end[61]. Each of the process surveys became also the starting point for each of the three diary-periods. The process survey had many elements in common with the process survey used by Kuhlthau (1993, p.97), with regard to the information seeking process. Regarding processes and factors related to the 'work task' and 'group work', the process survey was adjusted and enlarged to also encompass these elements. As shown in Appendix 10, survey questions appeared under three parts: A. project assignment, B. information seeking and C. group work. The questions under each part, concerned various aspects of activities and cognitive and emotional experiences.

Addressing the cognitive aspects of the *project assignment*, each participant was asked to describe shortly the topic and title of the assignment as one way to observe the progressing of focus, in line with Kuhlthau (1993). In addition, two statements were proposed to address the participants' ability to assess relevance in readings. It was based on the assumption that the more knowledge they had about their subject, the easier it was to assess relevance. Assignment activities covered both general and specific activities associated with the product as well as the process. Searching, reading, data collection, data analysis, discussing and writing were some of the activities in focus. Affective aspects in relation to the project assignment were addressed by asking the participants to state their emotional experiences with a number from 0 (not recognized) to 5 (high) in relation to 6 positive feelings (confident, satisfied, optimistic, relieved, motivated and serene=sense of direction) and 7 negative feelings (confused, doubt,

[61] It was an identical process survey that was handed out to the participants; only the date for handing in the survey varied.

stressed, frustrated, uncertain, worried/cautious). Only those feelings that were recognized by the participant should be assigned a value; those feelings that were not recognized, should be assigned a '0'. In this way it was ensured that all feelings had been taken into account when starting the data analysis. Recognized feelings that did not appear on the list in the survey should be noted under 'Other' and assigned a value from 1 to 5. As it appears, many feelings were similar to the feelings associated with the ISP-model, but also feelings that have shown to be associated with the work task (such as 'motivation' and 'stress') have been taken into account.

Under *information seeking*, 'activities' addressed various aspects of the information seeking process, such as forming a need, searching and talking to other knowledgeable people. The participants should mark which of the activities on a list they were engaged in at the moment. Activities that did not appear on the list should be noted under 'Other'. The information sources relevant at the specific moment in time as well as their importance should also be indicated. Two types of list were presented; one list with specific types of information sources, e.g. printed and personal sources, and one list with sources (channels) for finding the information. In both occasions, the participants should indicate the importance of the relevant information sources with a number from 1 (low) to 3 (high). To address the affective aspects of information seeking, each participant, as shown in the appendix, should indicate his or her experience of information seeking according to four pairs of positive and negative feelings on a scale from 1 to five. The positive feelings and their corresponding negative feelings were: easy/difficult, relaxing/stressing, simple/difficult and satisfying/frustration. The low value (1) represented the four positive feelings, whereas the high value (5) represented the corresponding negative feelings. If other pairs of positive and negative feelings had been experienced, the participants were allowed to note these in the survey and mark the value accordingly.

Regarding aspects of *group work*, each participant should describe shortly the activities taking place in the group at the moment. In addition, questions regarding frequency and form of contact with the other group members should be answered by marking a box in the survey with the correct answer. Concerning the cognitive aspects, each participant should indicate his or her agreement to four statements of group work. Finally they should indicate their perception of the atmosphere in the group with a number from 1 (bad) to 5 (very good). The participants were instrued to report activities and experiences *at the moment* rather than at the specific day of filling out the survey. However, this wording may have been interpretated differently by the participants, thus

reflecting data from various time periods, such as three days in one occasion and one week in another.

The use of a process survey to collect data on activities and experiences over time has certain advantages and limitations compared to direct observation of participants, e.g. while they were having group meetings, were seeking information or writing on the assignment. The form of the survey with standardized questions and answers allows for at structured collection of data where the researcher knows what questions have been posed and under what dimensions the answers are given (Launsø & Rieper, 2005). This further helps facilitate the comparison of activities and experiences across time. In addition, this form is less resource demanding than spending a lot of hours observing subjects. However, the answers are limited to what the participant is able to remember or is willing to respond to. In addition, the context of respondent's thinking is unknown to the researcher. Furthermore, a highly structured survey limits the flexibility and individualization of the method. It cannot be sure either, if all participants have the same understanding of the wording in the survey, which may affect the validity of the data. To compensate for some of these limitations, a more loosely structured, still indirectly observation approach, has been chosen. By supplementing the process surveys with diaries and interviews, the participant's inner and outer reality and understanding may better be reflected. In addition, it provides the researcher with more rich data on the individual level.

8.6.2 Diary

In line with case study 1, the diary method was used in this study to collect data on a daily basis on the group member's work task, group work and information seeking activities as well as emotional experiences. The diary in case study 1 (diary 1) served as a good guide for the interviews with the participants; both when deciding which issues to address in the interviews and during the interviews when referring to specific incidents. However, based on the methodological experiences drawn from case study 1 regarding reliability and validity, the diary and its application has been modified in support of this case study.

According to the literature on diaries (e.g. Alaszewski, 2006; Rieman, 1993), the diary method is a tool that may help bridge the gap between two basic research paradigms: the naturalistic paradigm (observations of entities in the field) and the positivistic

paradigm (studying entities in a controlled laboratory, isolated from their contexts). It enables the researcher to grasp both inner and outer aspects, thus also the interplay between person and environment as perceived by the diary keeper (Launsø & Rieper, 2005, p. 142). Diary keepers are instructed to record data of their own behaviour, hence the diary serves as a surrogate for direct observation when it is difficult to predict where and when relevant activities may take place. It is recommended, however, that diaries are used only for a shorter period since filling out a diary may be a tedious and time consuming activity. Thus, to minimize the burden on the participants and the risk of getting data based on memory or rationalizations made afterwards (in stead of on a daily basis), periods of no more than 14 days have been recommended (Rieman, 1993). However, the period must still be long enough to capture the behaviour or events of interest. Hence, in case study 2, the period had been shortened to *seven days* but at three selected points in the process: at start, at midpoint and at the end; each time initiated by a process survey reflecting status at a certain point in the process.

Further, the diary form should be practical appealing; meaning that it should be easy to fill out and to handle. Instead of an electronically administered diary, which turned out to hamper the daily recording of activities, the diary for this study (diary 2) was printed out and inserted in the binder that was handed out in the beginning of the study. In this way the participants could take the diary with them and record activities immediately after the activities had taken place. In contrast to diary 1, all the pre-categorised and pre-coded questions associated with either information seeking, group work or the work task have been left out of diary 2 to allow for a more *open* description of activities in the participants' own words. An obvious advantage of the free and *unstructured* format is that it allows for a (re)coding and analyzing of data *afterwards*. However, the labour intensive work required to 'post' code and make sense of the data may render it unrealistic for projects lacking time and resources or where the sample is large. In this case, the larger amount of text data deriving from unstructured formats was limited by the shortness of the diary period and the physical form of the printed diary.

As can be seen in Appendix 11, diary 2 presents a number of boxes in which the participant were instructed to record daily in his/her own words any assignment-related activity associated with the work task product, group work and information behavior.

The activities should be described chronologically and at best immediately after the activity had taken place. Further, the start and end of the activity as well as the time the diary had been filled out should be noted as it appeared in case study 1 that mood may change during the day, affecting the emotional experiences accordingly. In the final part of the diary, the participants should indicate their recognition and experience of each of the positive and negative feelings listed with a number from 0 (not recognized) to 5 (highly recognized)[62]. Recognized feelings *not* represented on the list should be noted with a value under 'Other'.This part of the diary should be filled out daily, even if no assignment-related activities had taken place.

Instructions in how to use the diary were given orally in connection with the introduction to the study. In addition, instructions were repeated in the diary, itself. In addition, the importance of recording activities on a continually basis was stressed during the diary periods to minimize the delay between the actual and the recorded activity.

To clarify the use of the diary and qualify recorded diary data, diary 2 was pilot tested for two days prior to the official start of the study. Comments and questions could be emailed to the researcher during testing time. In this way ambiguities concerning the diary were clarified before use.
Diaries provide a reliable alternative to the interview method for events that are difficult to recall accurately or are easily forgotten. They can, however, also be used to *supplement* the in depth interview by providing a rich source of information on participants' behaviour and experiences on a daily basis. According to Corti (1993), the 'diary-interview' method, where the diary keeping period is followed by an interview asking questions about the diary entries, is considered to be one of the most reliable methods of obtaining information. It allows for checking inconsistencies of informants' accounts, to fill in omissions and move beyond events recorded into more general experiences and attitudes. Thus, in line with case study 1, the diary period in this study was followed by an interview with each participant evoking reflections and (re)constructions of experiences and behaviour. As is has been proposed by Dervin & Forema-Wernet (2003), thought is discovered through its expression in language.

[62] The feelings were similar to the feelings associated with the work task in the process survey

8.6.3 Interviews

After the process survey had been handed in and the seven days-diary period had ended, each group member participated in an interview, that is, at start, at midpoint and at the end. Each interview lasted about 45 min. By interviewing the participants individually it became possible to explore whether and how group members would differ in their perception and experience of identical situations; whether and how their work task and information related activities were individually or collaboratively based and further, how perceptions and experiences evolved over time. A semi structured guide was made for each of the three interview sessions (Appendix 12), which addressed various aspects related to group work, the work task and information seeking in accordance with the specific point in the process. In addition, the process survey and the diary data helped generate input to the interview guides. In line with the process survey, all three interviews started by asking each participant to describe shortly what the assignment was about. The reason for this was two-fold. According to Kvale (1997), a contextual and experienced-based opening is very important as a way to frame the rest of the interview. Next, the question allows for determining how focus formulation changes over time at an individual level as well as for determining any similarity in understanding at a collective level. Besides this first question, interview guide 1 concerned the start of the process and the participants' activities and emotional experiences. Their previous experience in relation to group work was also addressed. Interview guide 2 concerned the participants' activities, experiences and perceptions at mid-point. For example, the participants were asked to state at what point in the process they considered the group to be, as it turned out in diary 2 that midpoint of the formal project assignment period did not neccesarily correspond to where in the process they perceived themselves to be. Also the impact from other work tasks on the work task in focus was considered, since it turned out from the diary data that *other tasks* seemed to affect the participants' work with the project assignment. Finally, interview guide 3 concerned the activities and experiences in the period up till deadline as well as the reflections made after the assignment had been handed in. To follow up on the divergence between formal and percieved point in process addressed in interview 2, participants were asked if they felt they had finished the assignment. The participants' experiences and reflections concerning their participation in the case study and the applied methods were also addressed in the last interview. The sequence of interviews followed the interview plan shown in Appendix 13, which was prepared in collaboration with the participants and was inserted in the binder as well.

The form of the interviews was informed by Dervin's *Sense-Making approach*[63], thoroughly presented in chapter 2, section 2.2.3. Besides serving as a tool for metatheoretical critique, a methodology for research, a theory about communication or guidance for communication design and practice, Sense-Making may also serve as a research tool, which is the case here.

The term 'Sense-Making' refers to a coherent set of concepts and methods used to study *how* people construct sense of their worlds, e.g. how they construct information needs and uses information in the process of sense-making. Hence, Sense-Making focuses on the constructive process of *meaning making*, not the meaning itself, by digging into what constitute a *certain experience*. According to Dervin and Frenette (2003), sense making may involve the making or using of an idea or both; cognitions, thoughts and conclusions; attitudes, believes and values; feelings, emotions and intuitions or memories, stories and narratives. In the most general sense, 'sense-making' can be defined as behaviour, both internal (e.g. cognitive) and external (e.g. procedural), which allows the individual to construct and design his or her movement through time-space. In case study 2, behaviour referred to *activities, cognitive and emotional experiences* in relation to 'group work', 'work task'and 'information seeking'.
The Sense-Making approach as a research tool focuses on getting out the informant's feelings, thoughts and experiences in relation to various situations and phenomenons through *dialogue* while the respondent makes sense of his or her reactions. This may result in a new understanding of the phenomenon in focus – both on the informant side and on the researcher side. A variety of techniques have been developed to establish alternative means for interviewing informants. In case study 2, the interview form was informed by the *micro-moment time-line* technique, which is the core technique of the Sense-Making approach (Dervin, 1983). It is derived from antropology, ethnography and clinical psychology and focuses on a single relevant and critical past incident in the informant's life[64]. More specifically, it involves asking an informant to detail what

[63] Sense-Making Methodology in capital letters is used to designate the approach in contrast to 'sense-making' as the focus of study.

[64] The micro-time-line interview technique is a variation of the 'critical incident method' for data collection. It focuses on a recent concrete incident to collect data on a phenomenon (Ingwersen & Järvelin, 2005, p. 91)

happened in a specific siuation step-by-step and then for each step what questions or confusions the informant may have had and what he or she needed to understand or make sense of. In essense, the aim is during the interview to tap situations (e.g "what happened?"), gaps (e.g. "what were you trying to learn about?"), bridges (e.g. "what emotions/feelings did you come to?…were related to the situation?") and outcomes (e.g. "how did [name] help/hinder that?).

The views presented by the informant may be vague and incomplete, but the concrete real past incidents and the detailed Sense-Making interview technique may help the informant to report on situations, gaps, bridges and outcome in a more focused and reliable way. In addition, time lines are a naturalistic and relatively unobtrusive way of collecting data on cognitive perceptions – and recent events seem to be easy for informants to remember. (Schamber, 2000). The drawbacks are – as with interviews in general - that the method is time consuming; it takes time to develop an interview guide, get trained and transcribe the results.

The questions in the three interview guides for case study 2 has guided the *content* of the interviews whereas the 'micro-moment time-line' technique has guided the *form* of the questions asked during the interviews. The form of the interviews itself was aimed at beeing as natural as possible to establish a comfortable and relaxed situation in which the participants felt free to answer on *their* conditions – insensible to the role of the researcher, besides her acting as a dialogue partner.

The interviews were recorded on an Olympus Digital Voice Recorder DS-4000. Each interview session resulted in 10 files that were grouped under a letter on the recorder: A (interview 1), B (interview 2) and C (interview 3). After each interview session, the files were transferred from the recorder to a transcription module on the PC and automatically saved in a corresponding folder named A, B or C.

8.6.4 Supervisor response

After the project assignments were handed in, the supervisor attached to each group was asked to indicate his or her judgement of focus in the project assignment with a number from 1 (weak) to 3 (strong). This information could be used in discussion of the cognitive experiences during the project assignment and whether focus changed from

weak to strong during the process, as it did for the individuals in the ISP-model. The supervisor feedback scheme is shown in Appendix 14.

8.7 Data analysis

8.7.1 Questionnaires

8.7.1.1 The demographic questionnaire

The demographic questionnaire generated categorical data for each group member on personal, group work, project assignment and information seeking issues. The data have been tapped into a printed demographic matrix, showing all questions at the vertical line and the answers for each group member at the horizontal line (see Appendix 15). From the demographic matrices one may generate group member profiles to be used in the discussion of information behaviour as well as for comparing characteristics across group members. The replies to number 11-23 concerning information seeking behaviour may also be used in the discussion of personality and information behaviour. The pre-coded response categories used in the questionnaire may also be used as a basis for generating various graphical diagrams.

8.7.1.2 The personality test

The personality test data for each participant were tapped into a calculating computer program on the Internet, resulting in various T-scores on factors as well as facets. The score assigned to each personality factor is based on a weighted average of the six underlying facets. From the computer program, reports have been generated showing the T-scoring for each participant on the five factors and the 30 associating facets.
To help analyze the data, the group member scores on factors and facets have been plotted into a scoring table based on T-scores ranging from ‘very low’ to ‘very high’, as shown in Appendix 16.[65] In Table 8.3, the scores and the characteristics associated with the ‘very low’ and the ‘very high’ end of the scale are presented. A T-score at 34 and below is considered as ‘very low’, a T-score between 35 and 44 is considered as ‘low’, a T-score between 45 and 55 is considered as ‘middle’ and averagely, a T-score between

[65] Appendix 16 shows the group members’ scoring on personality facets across the group

56 and 65 is considered ‘high’ and, finally, a T-score at 66 and above is considered ‘very high’.

		Very low	Low	Middle	High	Very high	
Factors	**T-scores/ Facets**	**< 34**	**35 – 44**	**45 - 55**	**56 - 65**	**66 <**	**T-scores/ Facets**
Neuroticism	Confident, optimistic, gentle, contented, calm, confident						Anxious, nervous, tense, irritable, pessimistic, shy, timid, impatient, hasty
Extraversion	Aloof, withdrawn, shy, independent, serious, reserved						Friendly, warm, sociable, outgoing, cheerful, enthusiastic, self-confident, talkative, energetic, quick, adventurous, humorous optimistic
Openness to experience	Mild, conservative, cautious						Dreamy, imaginative, artistic, idealistic, mischievous, empathy, wide interests, insightful, curious, unconventional
Agreeable-ness	Suspicious, pessimistic, hard-hearted, demanding, assertive, selfish, intolerant, self-confident, idealistic, unstable						Forgiving, trusting, warm, soft-hearted, generous, kind, humble, tolerant, friendly, collaborative, sympatric
Conscientious ness	Confused, absent-minded, careless (‘easy-going’), distractible, fault finding, impulsive, impatient, immature, moody						Efficient, thorough, resourceful, confident , organized, precise, methodical, ambitious, enterprising, determined, persistent

TABLE 8.3 Scores and the characteristics associated with the ‘very low’ and the ‘very high’ end of the scale. Values are explained in text.

The results from the personality test has been used to generate a profile of each group member which might help clarify or explain activities and cognitive and affective experiences in relation to group work, work task and information seeking behaviour

8.7.1.3 The process survey

The three process surveys from each group member resulted primarily in categorical data focusing on activities as well as cognitive and emotional experiences related to the work task, group work and the information seeking process at three selected points in the project assignment: start, midpoint and end. The data from the 30 process surveys have been plotted into Excel and matrices and graphical diagrams have been generated to show relevant process data across group members and across time. Text data

regarding the participant's description of title and focus of the project assignment from start to end have been analysed by the researcher to see whether cognitive aspects of the work task, such as focus formulation, changed over time. The specific analysis made in relation to the categorical questions in the process survey has been described in more detail in connection with the presentation of result.

8.7.2 Diary

The 30 diaries generated *descriptive* data on 'activities' and comments associated with the recorded data or the project in general. Since all data were given in physical form, all text-data in the diaries were transcribed directly from paper to electronic form (Word). Next, the documents were prepared for analysis in the qualitative data analytical program *ATLAS.ti* by converting the Word files into RTF (Rich Text Format). During reading and coding of the diary text in ATLAS.ti, a coding scheme developed. Section 8.7.4 describes the use of ATLAS.ti, the development of the coding scheme as well as the coding process for both diaries and interviews. The transcription of the diaries has been made by the author.
The diaries also generated *categorical* data on 'feelings' as perceived by the participants during the project assignment. These feelings have been registered and analyzed in MS Excel.

8.7.3 Interviews

The aim of the interview analysis has been twofold: 1) to be able to understand how activities, cognitive and emotional experiences had been perceived and experienced by each individual group member in the study, 2) to triangulate and support the analysis of the process surveys and the diaries.

To prepare the interviews for analysis in the analytical program ATLAS.ti, all audio files saved in folder A, B and C on the computer had to be transcribed into text. Instead of a word-to-word transcription, only the relevant parts have been transcribed. While playing the audio files, unnecessary material such as side leaps, repetitions and unimportant details were ignored to concentrate on making a condensation of the relevant parts associated with the research questions. The transcription of the 30 interviews was firstly made on paper in a form similar to storyboards. The first question posed by the interviewer was noted on the paper and marked with a 'Q' for question.

Then the interviewee's answers was noted in condensed form. And so forth until the interview had finished. Arrows between the various elements were assigened to guide the reading of the transcript. At regular intervals, a time stamp was noted in brackets on the paper, which referred to the time stamp on the audio files. This would ease a replay of one specific sequence later on. Every transcript was provided with the ID number of the audio-file, the date of recording and the duration time of the interview given in minutes. Figure 8.1 shows an example of one of the transcribed audio files by using the 'storyboard technique'. Inspired by a course for doctoral students on methodology, this technique was developed by the researcher to provide an overview that would allow for early analysis of the material as well as ease a condensed transcription of the interviews[66].

[66] This technique, constituting a transcription and an analytic tool, may also be applied to other type of data recordings, e.g. to observations, either in real life or during video play back.

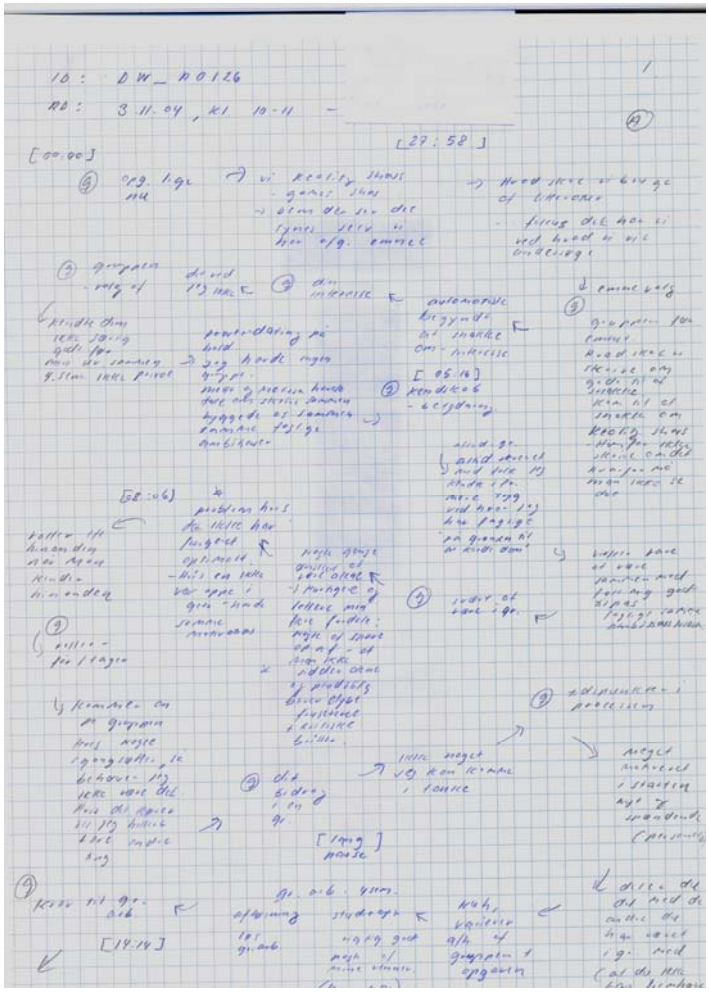

FIG. 8.1. An example of the ‘storyboard technique’ applied to interviews

After the transcription on paper, all the condensed notes were transcribed into electronic form (Word), while replaying specific parts of the audio files to ensure the transcription was correct. Before converting all the Word files into RTF for importation into ATLAS.ti, the Word files were spell checked to qualify the search facility in ATLAS.ti. All interviews have been transcribed by the author.

The research questions and the three interview guides have guided the analysis of the 30 interviews in order to elicit important concepts, themes and categories from the individual group member’s perceptions, experiences and reflections of events and behaviour during time-space.

The analysis of the interviews (and diaries) using ATLAS.ti is described in detail below. The coding process and the resulting coding scheme is described in section 8.7.5.

8.7.4 ATLAS.ti

To help analyze the qualitative data from case study 2 (diaries and interviews), ATLAS.ti vers. 5.0 was applied. ATLAS.ti provides a tool for the researcher to organize and document themes within his/her data. In addition, it has proved effective in revealing underlying conditions in the information seeking process (e.g. Foster, 2005; Wilson, 2004). It is a workbench for qualitative analysis of large bodies of textual, graphical, audio, and video data – a systematic approach to unstructured data, e.g., data that cannot be meaningfully analyzed by formal, statistical approaches. The sequence of steps and the processes involved using ATLAS.ti is shown in Figure 8.2 and described in detail below.

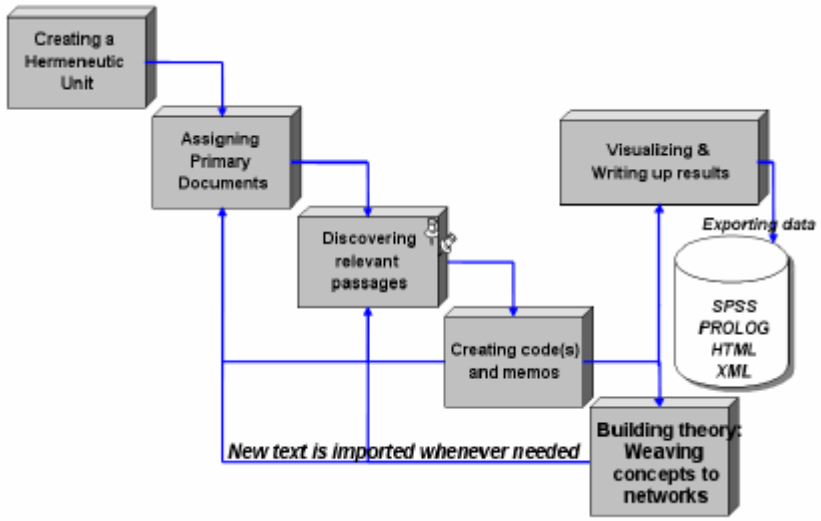

FIG. 8.2. The ATLAS.ti workflow (ATLAS.ti 5.0 Online Help)

The first step in the analysis was to create a project, an ‘idea container’, which is meant to enclose all data such as text documents, findings, codes, memos, and structures under a single name. This is called a ‘Hermeneutic Unit’ (HU). The HU provides the data structure for each project in ATLAS.ti. Everything that is relevant to a particular project is part of the HU and resides in the electronic environment. The HU is activated by

selecting a single file, and all the associated material is then activated automatically. The name of the HU for this project is *IndiGroup-phd-project*.

Next, the documents, such as the diaries and interviews, should be prepared for import and use in ATLAS.ti. All documents were cleaned and edited before importation, which in this case meant convertion from Word format to RTF-format. Then the documents were loaded into the HU. In HU terminology, documents are named 'Primary Documents' (PDs). PDs play a major role in ATLAS.ti's framework, since they are the interface between a Hermeneutic Unit (HU) and the data. They provide access to data sources, which are usually files stored on the disks of ones computer or network. Each PD is assigned a number automatically when loaded into the specific HU of ATLAS.ti. When the 30 diaries and 30 interviews were loaded into the *IndiGroup-Phd-project*, the first diary loaded into the HU was named PD1, the second PD2 etc., whereas the first interview loaded into the HU was named PD31, the second PD32 etc.
Figure 8.3 shows the various objects in a HU: PDs, quotations, codes, families and memos.

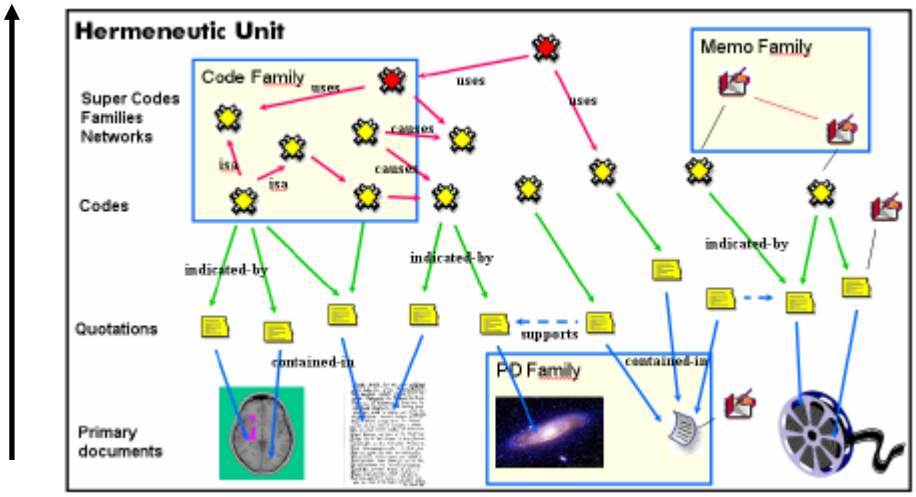

FIG. 8.3. The hierarchy of objects inside a Hermeneutic Unit from the bottom up: From Primary Documents (PDs), such as text and video, Quotations are selected and assigned one or more Codes. PDs and codes may be categorized into Families for search and management purposes. Networks of codes may be generated by various relations. Reflections regarding certain objects or the analysis process may be written in a Memo. (Modified after ATLAS.ti 5.0 Online Help)

Then the reading and selecting of relevant text passages and quotations for coding could begin. Section 8.7.5 describes in more detail the coding process and the coding scheme that emerged from that.

To keep track of the coding process and memorize the thoughts and reflections made during coding and analysis of diaries and interviews, two memos were generated: the 'Diary Journal' and the 'Interview Journal'.

After having coded the relevant text and quotations in documents, ATLAS.ti provides various ways of using codes for further analysis. For example, you may search for and compare data segments based on the codes you have assigned. Or you may organize PDs, codes or memos into 'Families'. A family is a category to which all related objects belonging to that category are assigned. This may help search for data or quotations in the text. Various families have been created in this study, e.g. PD-families for diaries, interviews and for groups as well as CODE-families representing classes of codes. For example, the family code FEELINGS represents all kinds of feelings coded in the diaries and interviews. By the help of families, one may for example restrict a search for 'feelings within group A in the last interview' by combining the code-family FEELINGS with the PD-family GROUPA and INTERVIEW3. Appendix 18 shows a list of all the families created in ATLAS.ti for documents (PDs) as well as for codes.

The next section describes the use of codes and the generation of a coding scheme in Atlas.ti.

8.7.5 Codes and the coding process

From a methodological standpoint, codes serve a variety of purposes. They capture meaning in the data; they also serve as handles for specific occurrences in the data that cannot be found by simple text-based search techniques. From a 'low level' tool perspective, codes are typically short pieces of text referencing other pieces of data. They can be used to classify an often large number of textual or other data units. In the realm of information retrieval systems, 'codes' and 'coding' correspond to terms like index, indexing and keyword.

In case study 2, codes have been used as indexing devices at different levels of abstraction in order to create sets of related information units for the purpose of comparison and analysis.

Since Atlas.ti rests on the grounded theory methodology, the coding approach was based on the 'dynamic coding process' presented by Strauss & Corbin (1998)[67]. Among others, it implies three coding activities: open coding, axial coding and selective coding. However, the coding approach employed to code the diaries and interviews in case study 2 has primarily involved the 'open' and 'axial coding' activity.

Open coding is the first analytical step and refers to "the analytic process through which concepts are identified and their properties and dimensions are discovered in data" (Straus & Corbin, 1998, p. 101). To discover concepts, the text must be opened up to let the thoughts, ideas and meanings contained therein get exposed. Through open coding, data are broken down into discrete parts, closely examined for similarities and differences and given a name that represents or stands for it. Events, happenings, objects and action that are found to be conceptually similar in nature or related in meaning are grouped under a more abstract concept termed a *category*. Categories are concepts, derived from data that stand for phenomena which are the important analytic ideas that emerge from data. These phenomena depict the problems, issues, concerns and matters that are important to those being studied. The name chosen for a category is usually the most logical descriptor for what is going on. The naming of categories generally depends on the research context, thus the categories both depend on and reflect the focus of the research.

'Axial coding' refers to "the process of relating categories to their subcategories, termed 'axial' because coding occurs around the axis of a category, linking categories at the level of properties and dimensions (Straus & Corbin, 1998, p. 123). The purpose of axial coding is to begin the process of reassembling data that were fractured during open

[67]Grounded theory is a methodology originally developed by two sociologists Barney Glaser and Anselm Strauss that was later revised by Anselm Strauss and Juliet Corbin. According to Strauss & Corbin (1998, p. 12), grounded theory is "… theory that was derived from data, systematically gathered and analyzed through the research process."

coding. In axial coding, categories are related to subcategories to form more precise and complete explanations about phenomena. This may, however, take place already during the process of open coding.

Finally 'selective coding' refers to "…the process of integrating and refining categories" (Strauss & Corbin, 1998, p. 143).

The coding process started out by 'open coding' of the 30 diaries (PD1-PD30). While reading the diaries, starting with the 10 diaries from the first diary period, relevant quotations and text passages, typical between 2 and 10 lines, were coded according to the research focus represented in the research questions. No coding scheme or list existed from the beginning but emerged as the coding process proceeded. Since the diary focused on collecting data on participants' various *activities* or *events* associated with the assignment, the codes generated from the diaries are primarily *activity* codes, e.g. 'reading', 'writing' and 'information seeking'. However, since the participants were also invited to make personal comments in the diaries, codes have also been generated that reflect participants' personal reflections and perception of the situation.

After the coding of diaries, the coding process proceeded to the interviews. Based on a re-reading of the three interview guides and the interview memo, the coding of the 30 interviews (PD31-PD60), starting with the 10 interviews from the first interview session, followed the same procedure and stategy as used in relation to the diaries. However, the 'open coding' of the interviews did not start from scratch, but was guided by the emerging coding list, which was activated in ATLAS.ti whenever a relevant quotation or text had been identified, as shown in Figure 8.4.

In addition, the interview data also resulted in many new codes that besides *activities* represented *nouns*, *adjectives*, *objects* and *concepts.*

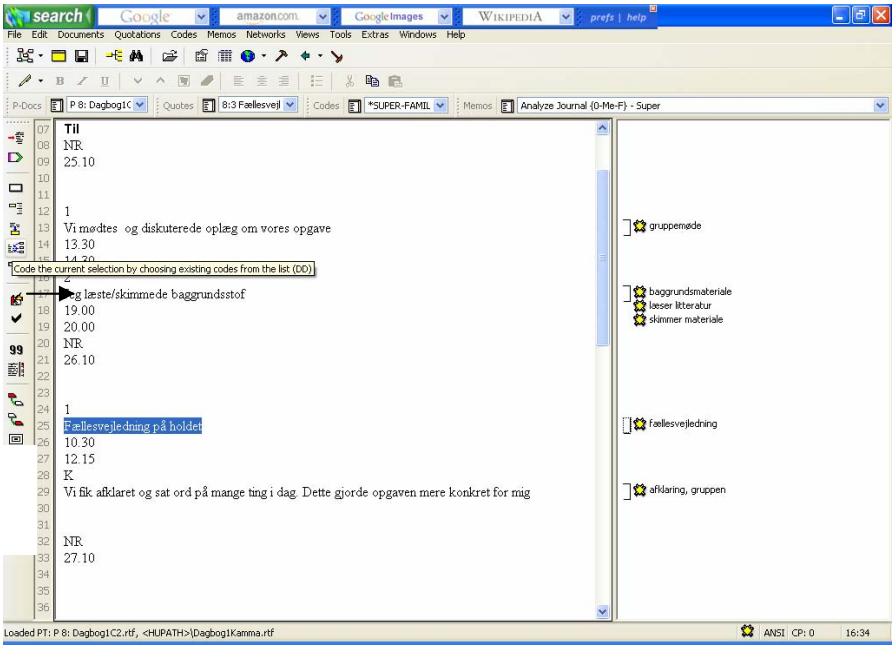

FIG. 8.4. An example of a PD being coded in ATLAS.ti.

The quotation to be coded is highlighted; then the coding scheme is activated (the symbol next to the arrow). After the selection of code(s), the assigned codes are shown in the right column next to the quotations

In the beginning of a coding process it may be difficult to decide exactly how the data should be coded, thus 'double coding' may be applied as a good strategy (Launsø & Rieper, 2005?)[68]. As the coding process proceeds, the double codes may then merge into one distinct code that at best reflect the specific phenomenon in focus. The 'double coding' strategy was also applied in case study 2. As the coding process proceeded, codes were removed, renamed or merged into new codes, which consequently implied that text in diaries and interviews had to be re-coded. However, many of the 'double codes' still exist as a consequence of text passages or quotations that actually *did* reflect more phenomena or aspects of the research focus.

After the initial coding of the diaries and interviews, the codes were reviewed in order to identify relations between codes that might form a category or class in line with the principle of 'axial coding'. However, in stead of using the network tool in Atlas.ti to establish and express hierarchical and associative relations between codes, relevant relations between codes were pre-coordinated by generating a new code. The pre-coordinated relation was generally of the type 'is associated with' or 'is cause of'. To

[68] Double coding means that more codes are used to code the same text passage

give an example, many codes have been generated that represent various types of positive and negative feelings, such as ‘satisfied’, ‘confident’, ‘frustrated’ and ‘uncertain’. These feelings were often either ‘associated with’ or ‘cause of’ group work, work task or information seeking. Thus, to ease the search for quotations and text for further analysis, new codes on feelings were generated that expressed these relations. For example, the code named ‘satisfied’ was changed into various pre-coordinated codes such as ‘satisfied, group’, ‘satisfied, work task’ and ‘satified, information seeking’.

The outcome of the coding process was 199 unique codes, which are shown in Appendix 19.

In addition to the coding list, various code FAMILIES have been created to establish *classes* of codes that may ease the search for relevant text and quotations in data. These classes collect all codes *related* to the class. In line with the codes mentioned above, the code family may also express a certain relationship between codes. To follow the previous example, various families of ‘feelings’ have, for example, been generated that either cover specific *types* of feelings or expresses a specific *relationship*. The families generated in relation to ‘feelings’ are the following: FEELINGS (cover *all* types of feelings); POSITIVE FEELINGS; NEGATIVE FEELINGS; FEELINGS, GROUP; FEELINGS, WORK TASK and FEELINGS, INFORMATION SEEKING.

All codes from the coding list have been assigned to one or more code families The code families generated in case study 2 are shown in Appendix 20.

8.8 Data validity and reliability

To optimize the data validity and reliability of case study 2, the limitations of case study 1 such as the employment of diaries and interviews have been taken into account as part of the methodological framework just presented and reflected upon. However, case study 2 also too has resulted in methodological experiences that may contribute to our understanding of qualitative research. These experiences are, though, not addressed in this section, but will be discussed in section 9.4 in connection with the methodological experiences gained *across* case study 1 and 2 - hence, pointing to issues that should be taken into account in future studies of human information behavior.

9 Results of case study 2

This chapter presents the results of case study 2 following the research issues addressed in the questionnaires, the diaries and the interview guides. First follows the results associated with *group work* and the social dimension of information behavior, next the *work task* and the contextual dimension of information behavior and finally follows the results associated with *information seeking* (strategies, choice of information sources etc.). Results related to *personality* and the personal dimension of information behavior have been integrated in the result presentation where relevant but in particular in the section on information seeking. The dimensions are not mutually exclusive, but partly overlapping.

Compared to the theoretical part, the *sequence* of dimensions has changed in this chapter by starting from the *inside-out* due to the conceptual model of the thesis in section 1.4.5.
Hence, the chapter starts with a presentation of results associated with the group and the individual group member (I) as an embedded part of the group (G), and continues to results associated with the work task (W). Though information seeking constitutes a subtask of the work task, and has not been depicted *separately* in the conceptual model, it has been addressed in a separate section as it is the behaviour under exploration in this thesis.

Due to the difference in research dimensions (group work, worktask etc.), each section presents aspects that only are relevant to the specific dimension in focus. However, since the aim of this thesis is to explore the ISP-model in a group based setting, *activities, cognitive* and *affective* aspects have been addressed in each section – in line with the result presentation of case study 1. In relation to these aspects, several Tables and Figures have been produced to present result data from diaries and proces surveys. Some of these will be referred to directly in this chapter, whereas others can be seen in the Appendix. For example, Appendix 28-33 show *all* Tables regarding group members' work task and information seeking *activities* and Appendix 24-27 show *all* Figures of group members' emotional *experiences* during time.

Each result section starts with a short introduction and ends with a summarization of the main results, which also implies a *short* discussion of results *across* case study 1 and case study 2. Based on the results presentation, this chapter leads up to a *thorough* discussion of the results in chapter 10 in accordance with the five research questions and the theoretical part of the thesis.

Quotations are used in this chapter to support the presentation of group member behavior and the interpretations of results made by the author. Quotations from diaries and interviews are referred to by the number of the interview session (or diary), then the participant-number, the PD-number and finally the line number of the primary document, as shown in this example (Interview1, B1, P35: 223). If the participant number already has been mentioned in the text, this information will be left out of the reference. To ease the reading of the text, the references have been put in a footnote. All quotations have been translated by the author.

9.1 Group work

This section presents the results associated with the group member and group behavior derived from *group work*, hence shifting between a group level and an individual level of presentation. As indicated by Figure 9.1, the cognitive actor in focus shifts between the *individual group member* interacting with the group, and the *group* interacting with (or compared to) other groups. In addition to this, an outer social/cultural/organizational context is present in both cases that further frames and interacts with group member and group behavior.

The section starts with a group member characteristic across groups, demonstrating similarities and differences between group members that may help explain behavior over time. Then, the initiation of the group work process is addressed by outlining the group members' perceptions of successful group work and their expectations for the present group work. In addition, their motivations for group formation are presented. Finally, the *activities* associated with *group processes* are addressed, implying form of communication and collaborative problem solving strategies initiated by the work task (the project assignment), which result in *cognitive* as well as *affective* experiences.

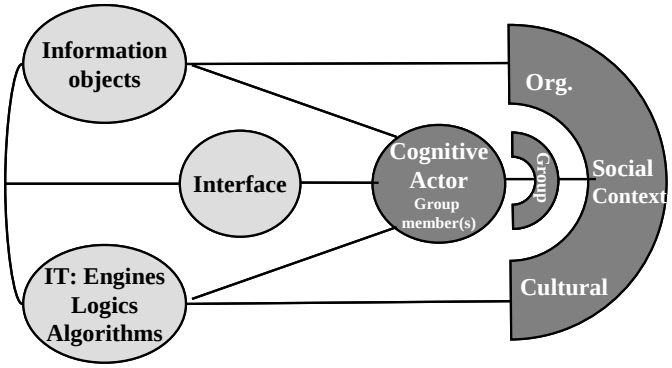

FIG. 9.1. Stratified Context-model of 'group'.

The dark grey elements are in focus in Section 9.1

(— = interaction) Extended version of Ingwersen & Järvelin (2005).

9.1.1 Group member characteristics

Three groups of information science students participated in the study. They are hereafter referred to as Group A, Group B and Group C. Group A consisted of three members respectively referred to as: A1, A2 and A3. Group B also consisted of three members referred to as B1, B2 and B3. Finally Group C consisted of four members referred to as C1, C2, C3 and C4. Besides C4, all participants were females.

Below, the characteristics of group members across groups are described and compared at a general level (five personality factors). In addition, a summary of the characteristics of each group at start is given based on the *detailed* descriptions of each group member shown in Appendix 21-23. The group member descriptions are based on data from the demographic survey (Appendix 9), the personality test (Appendix 16) and the interviews concerning group work and group members' approaches to the assignment. In the analysis and description of each group member's personality, all five personality factors have been taken into account. However, not all the 30 facets have been addressed with the same weight in each description of group members; either because of the facets' variety in scores across group members or because of the facets' variety in relevance to the generation of a group member description. 'Aesthetic' is an example of a facet that has been left out of the descriptions. Being good at layouting the project assignment, for example, may not help clarify or explain the various activities, experiences and behaviour in focus here. The group member profiles will be returned to

in the description and discussion of group member activities and cognitive and affective experiences in relation to group work, work task performance and information seeking. The relation between personality and information seeking is not part of the group member profiles, but will be addressed in connection with group members' information behavior in section 9.3.4.

It is *very* important to stress that the group member descriptions and group characteristics represent *predictions of behaviour*, e.g. how each group member will behave in specific situations, rather than *absolute* characteristics of the 10 group members. The form of writing will reflect this as far as possible. Some descriptions also rely more on interview data than others, which explain the variance in quotations and citations. Appendix 16 shows all group member scorings on factors and facets according to the personality scoring scheme, presented in section 8.7.1.2. Appendix 17 shows the scores on factors and facets across group members within each group.

Table 9.1 shows the 10 group members' scoring at the *general* level (five factors) according to the personality scoring scheme.

	Very low	**Low**	**Middle**	**High**	**Very high**
T-scores	**- 34**	**35 – 44**	**45 - 55**	**56 - 65**	**66 –**
Neuroticism		B3	A1, C2, C4	A2, A3, B1, B2, C1, C3	
Extraversion			A1, A2, A3, B1, C1, C2	B2, B3, C3, C4	
Openness to experience			A1	A2, A3, B1, B2, B3, C3, C4	C1, C2
Agreeableness	A3	A1, A2, B2, C3	C1, C4	B1, C2	B3
Conscientiousness	B1	C4	A1, A2, A3, B2, C1, C2, C3		B3

TABLE 9.1. Personality scoring scheme (five factor-level) across group members

It is interesting to see that many of the group members scored 'high' on the factor concerning *neuroticism*, which indicates that the participants may be relative sensitive to stress and uncertainty. Only one group member, B3, seemed to be capable of managing demanding situations in a calm and stable way. In relation to group work it is worth noticing that all group members scored 'middle' to 'high' on *extraversion* – one of the social factors. This may, however, not be a surprise when taken into consideration

that all participants voluntarily joined the case study, partly out of an interest in group aspects. It is also remarkable that most of the group members scored ‘high’ - and in two occasions even ‘very high’ - on *openness to experience*, which consider intellectual aspects. This indicates a positive attitude towards changes, an intellectual curiosity and willingness to think in alternative and unconventional ways that may also be seen as an uncertainty orientation towards cognitive gaps. What *agreeableness* is concerned, the scores were interestingly more regularly spread. As can be seen, all the group members from group A were scoring ‘low’ to ‘very low’ (A1-A3), indicating a more critical and tactical attitude towards life which also can be experienced as reserved and aloof in relation to other people. In the ‘middle’ to ‘higher’ end of the scale, three group members from group C were found (C1, C2, C4), while two group members from group B (B1, B3) were found in the ‘high’ to very high’ end of the scale. In contrast to group A, this indicates a trusting, warm, tolerant, friendly and collaborative attitude, which in some cases also can be regarded as naive. On *conscientiousness*, the group members were generally scoring ‘middle’. Only three group members differed from this by scoring ‘very low’ (B1), ‘low’ (C4) and ‘very high’ (B3). This is, however, interesting to notice that the ‘very low’ and the ‘very high’ scores concerned two group members from the *same* group. According to the presentation of ‘conscientiousness’ in chapter 5 on personality, the ‘middle’ scoring on this personality factor, however, may indicate that group members will show a *tendency* towards an efficient, confident and enterprising group work behaviour.

Summary group A

Group A is characterized by three group members who have a very *similar* personality at the general level. Only minor variances exist with regard to ‘neuroticism’, ‘openness to experience’ and ‘agreeableness’. Looking at the characteristics at the facet level more nuances turn up. The most striking *differences* can be noticed in relation to the facets: ‘pessimism’, ‘social anxiety’, ‘uncertainty’, ‘excitement seeking’, ‘imagination’ and ‘orderliness’. Values change here from ‘low’ to ‘high’, from ‘middle’ to ‘very high’ and from ‘very low’ to ‘high’. The most striking *similarities* can be noticed in the facets: ‘warm’, ‘dominating’, ‘emotional deep’, ‘sympathy’, ‘feeling of responsibility’ and ‘performance focus’.

Summary group B

Group B is characterized by three group members with a very *different* personality – both at the general and at the facet level. Except for 'openness to experience', they differ at all the other factors, either between one group member and the other two or between all of them. Looking at the facet level, the most remarkable *differences* across the group are seen in relation to 'pessimism', 'sincerity' and 'feeling of responsibility'. Values change here from 'very low' to 'very high'. Other differences of importance can be noticed in relation to the facets: 'anxiety', 'temper', 'social anxiety', 'uncertainty', 'emotional deep', 'tolerance', 'trustful', 'charity', 'indulgence', 'feeling of competence', 'orderliness', 'self discipline' and 'steadiness'. Here the values change from either 'very low' to 'high' or from 'low' to 'very high'

Summary group C

Group C is characterized by four group members who generally, either two by two or three by one, have the same personality factors and facets in common. For example C2 and C4 score 'middle' on Neuroticism; C1 and C3 score 'high'. If looking at 'extraversion', C1 and C2 score 'middle'; C3 and C4 score 'high'. What the facet scorings are concerned, the similarities are more *randomly* spread across group members, meaning for example that no pairwise pattern could be recognized. The facets that are *shared* by most group members are 'positive emotions', 'experimental' and 'tolerance' (three group members scoring 'high'); 'anxiety', 'temper', 'uncertainty', 'modesty', 'sympathy' and 'performance focus' (three, but not the same three group members scoring 'middle'); and finally 'self-discipline' (another three group members scoring 'low'). Only in two occasions, no similarities across group members were found. This is, interestingly with regard to group work, 'intellectual curiosity' and 'orderliness'. The rest of the facets are shared, either two by two or by two group members only.

9.1.2 Perceptions of successful group work

In line with the pre-liminary investigation on students' perceptions of constraints to group work (section 8.2), each participant was asked about his or her perception of group work in the first interview, in particular with a focus on the requirements for *successful* group work[69]. The aim was to get an impression of group members' group

[69] Perceptions of successful group were also touched upon in later interviews, however.

work experiences and expectations for the present group work at start that could lead to a better understanding of their behavior during time. In addition, this was also a way to get insight into the characteristics of group based problem solving (in academic settings) as *opposed to* individual problem solving.

To support data analysis, all relevant quotations coded as 'group work quality' (gruppe-kvalitet) and 'individual quality' (individ-kvalitet) in ATLAS.ti were assigned a number from 1-4, which corresponded to the four categories resulting from the perception analysis of constraints to group work: 1) Group member similarities and divergences 2) Collaboration issues, e.g group discipline 3) Individual/personal issues and 4) The form of group work, meaning group work versus working individually. During this process, some of the quotations turned out to be related to the outcome of group work, resulting in a fifth category 5) Outcome of group work. In the following, the participants' perceptions of group work are described according to these five categories. The categories, however, are not mutually exclusive, but partly overlapping.

In relation to *group member similarities and divergences* (category 1), 'same ambitions' was often mentioned as one of the most important requirements to successful group work. According to A2 for example, you transfer your ambitions to the other group members and cannot help judge their performance according to that[70]. Also 'same expectations' was mentioned as important to group work. With regard to the assignment (the collective product) most of the participants agreed upon the quality of having group members with the same understanding of what had to be done in the project. This was related to the *collective* understanding of focus in the assignment which further seemed to affect the community spirit in a group. As C1 pointed out, it is nice when you recognize and understand what the other group members are talking about[71]. In addition to this, the existence of a concordant academic standard in the group was mentioned as critical to the learning outcome from group work. According to B2, *learning* from group work in stead of nursing weak group members was important, implying that the academic level in a group should be at least the same as hers. In this relation, the constraints deriving from different working styles was mentioned by many of the

[70] Interview1, P32:67.

[71] Interview1, P31:197-198

participants. According to B2[72], however, "…it is something that you should get used to" or "…should learn to accept…", as C1 pointed out, while referring to a specific negative situation in the present group[73]. In addition to the learning aspect, A2 mentioned the positive effect of having different educational backgrounds represented in the group, since it affected the perceived cognitive authority of other group members[74].

Collaborative issues (category 2) were also stressed as important in relation to successful group work. It is critical that all group members engage and take part in the project; and that they will share the responsibility and act conscientiously towards the other group members and the group. Otherwise, it may cause interpersonal problems and affect the assignment as well. It may also cause problems if one member in the group take charge. Several participants mentioned this, which they perceived as a dominating behaviour that prevented them from taking actively part, and made them feel like 'employees' rather than group members working on a common project. Further, dominating group members tended to destroy or hinder a good team spirit. It was also important that group members respected appointments and attended group meetings well-prepared. Problems may arise, for example, when some of the group members leave a meeting to go shopping, which gives the impression that the group is less important, as C2 pointed out[75]. With regard to the group process, it was a quality if group members were aware of each others' parts or subjects in the assignment, e.g. by helping with information and advices. This could also be seen as an aspect of social awareness. In addition, more participants mentioned that group discussions were very important to ensure a collective understanding of the project. The importance of the social dimension of group work was also pointed out by many of the participants. For example, it affected positively if you found the other group members sympathic and found it 'cosy' to work with them, without loosing the professional focus, however.

[72] Interview3, P60:46

[73] Interview3, P51:127-203.

[74] Interview1, P32:107.

[75] Interview3, P56:163.

Regarding category 3 and *the individual/personal issues*, it was very important to feel safe, respected and accepted in the group. For example, it provided the basis for giving constructive feedback, saying what you like, asking 'silly' questions or coming up with new ideas and suggestions. Furthermore, when you feel safe in a group, uncertainty and lack of confidence seem to decrease, as B3 pointed out, because the group helps you make decisions and ensure that you are on the right track[76]. In a group, it is also important to be open to new ways of doing things, as some of the participants mentioned, hence, implying tolerance towards other group members.

As already indicated above, *group work as form* (category 4) ideally implies a shared responsibility, which tends to affect the individual group member's emotional experiences positively. In turn, it may also make some group members feel uncertain and unsure about their own capabilities, e.g. whether they actually is capable of doing anything on their own. Group member B1, for example, had never made an assignment on her own before, so in future, she needed to prove to herself that she was capable of doing this, "…sometimes I get this feeling [in group work], well, I do not really do anything by myself …" [77]. Despite this, "...group work is cooperation, not a safety net – otherwise it is just three individuals who prepare their own text and collect it at the end"[78]. Group work may also affect the working practice of the individual group member. According to C3, she would for example, have spent more time with her family during Christmas, if she had not been in a group[79]. However, many of the participants pointed out that group work was easier and faster. In addition, "…it is cool when the group meets, implying more dynamics and perspectives"[80].
The importance of having the other group members as critical sparring partners was also pointed out by many of the participants. Group member B2, for example, amplified the statement by saying: "…every time you put something on paper, you know you must present it to the other group members, who may not be as enthusiastic as oneself…"[81].

[76] Interview1, P59:147-152.

[77] Interview3, P55:147-155.

[78] Interview1, P35:175-176.

[79] Interview3:P57:148-153.

[80] Interview2, A2, P42:197:198.

[81] Interview3, P60:175-183.

This was supported by B1, who also mentioned the importance of not being alone, for example on occasions where you suddenly get very frustrated[82]. In continuation of the emotional experiences, more of the participants mentioned that group work compared to working individually made them feel *less* stressed, nervous and uncertain, e.g. about the quality of the product and the process, and whether theories were understood correctly. As one participant pointed out, it was in the interaction with the other group members she got the understanding of the theory. The group also made some group members feel less anxious about whether they would finish in time. The number of group members was also mentioned by some of the participants as important to group work. Two members, for example, would too easy come into an agreement with each other, whereas three in a group would be better at enlarging the challenges, as B2 positively remarked[83].

As already touched upon, some participants referred to the *outcome of group work* (category 5) as an important quality of group work. In this connection, *cognitive* outcome, such as understanding and learning was stressed. In addition, several group members emphasised the importance of the *cooperative cognitive process*, such as exchange of knowledge and information and feedback from other group members.

These requirements for and reflections on successful group work were further demonstrated in the group members' motivations for group formation.

9.1.3 Group formation

As part of the first interview, group members were asked about their motivation(s) for joining the group – cognitive (work task-oriented), social, a combination or other? Besides the fact that group formation was welcomed as part of a pedagogical strategy at that semester, *familiarity* with other group members was often mentioned in the interviews as an explanation for group formation[84]. In comparison, the subject of the project assignment or congruent interests seemed to play a minor role to the individual's

[82] Interview3, P55:368:372.

[83] Interview1, P40:67-73.

[84] The analysis was based on quotations extracted from Atlas.ti by searching on 'familiarity with group members' (gruppekendskab)

choice of group and group members. As B3 pointed out, "…the group is more important than the subject…often you also share the same interests"[85]. According to Appendix 9, number 6-6a, the group members generally knew each other, e.g. from other courses or classes. In addition, group A and three of the members of Group C knew each other from previous group work, whereas the members of Group B and C3 had no previous group work experience with the specific group.

Often, however, familiarity with other group members was associated positively with various *work task factors*. As C1 said: "…you do not have to spend time getting to know each other, you know already what role to take in the group"[86]. And further A2:" … we get on with each other very well – I simply would not have the strength to get to know new group members socially as well as collaboratively... We [group A] have the same requirements and ambitions. You can trust them"[87]. The same was mentioned by members of group B and C. Group member C2, for example, who had a small child and a job, emphasised the importance of trust, meaning that you could be sure they [the group members] would do the things they been agreeing upon. According to B2 familiarity meant a lot, since she made heavy demands on herself and consequently on other group members' ambitions and working styles. C4 also mentioned that he felt more free to discuss and put forward critiques when he knew people well. This statement was supported by B3 as well. However, as A2 pointed out, familiarity may also *hinder* a free and critical discussion in fear of hurting other group members. In addition, familiarity due to previous group work, may maintain inappropriate roles in the group. As indicated, the importance of familiarity in group formation was also associated with affective experiences. Many of the participants mentioned that it made them feel more safe, relaxed and confident, "…even if we are rather confused", as C1 pointed out[88]. In addition to this, "…you do not carry the responsibility all alone and may finish in time…otherwise, I would have felt more stress", C4 explained[89].

The rest of this section presents the activities associated with the *group process*, implying form and pattern of communication, the collaborative problem solving activies

[85] Interview1, P39:39.

[86] Interview1, P31:49.

[87] Interview1, P32:43.

[88] Interview1, P31:57.

[89] Interview1, P34:91.

initiated by the work task (the project assignment), as well as the *cognitive* and *affective* experiences.

9.1.4 Group activities

9.1.4.1 Form and pattern of communication

As one of the important sub-tasks (or functions) in group work, the form and pattern of *communication* in each group has been analyzed, hence also demonstrating examples of declarative and procedural knowledge and skills of communication channels.

The results presented below are based on data from the process surveys and on quotations extracted from Atlas.ti by combining 'group number' (e.g. 'gruppeA' etc.) and the family code GROUP WORK, COMMUNICATION. According to this, the *frequency* of communication in each group differed across time and between groups. As shown in Figure 9.2, all groups were at least in contact with each other once a week. In addition, the frequency of communication in group B *increased* towards deadline from 'weekly' to 'several times a week' in the last period , and in group C from 'several times a week' to daily in the end. In turn, the frequency of communication in group A *decreased* from 'more times a week' to 'weekly' in the last period. At the time of reporting (the last process survey), each group member was still involved in the delegated part of the assignment implying individual writing activities, which may explain the decrease in contact. It should, however, be noticed that the process surveys only show communication frequency 'at the moment', hence only *indications* of communication behavior. This implies that the group members may have reported differently if they had been asked at another point in the process. The last interviews, for example, revealed that all groups, not surprisingly, had been meeting 'daily' in the last few days up till deadline.

	22.10				19.11				17.12			
	Daily	Seve-ral times a week	Week-ly	Other	Daily	Seve-ral times a week	Week-ly	Other	Daily	Seve-ral times a week	Week-ly	Other
Group A		x				x					x	
Group B			x				x			x		
Group C		x				x			x			

FIG. 9.2. Frequency of communication within each group based on question C.1.2 in the process survey: *How often are you in contact with your group?*

In addition to 'frequency of communication', various *forms* of communication were employed during the assignment period as demonstrated in Figure 9.3.[90] Physical 'group meetings' were, however, preferred by all groups to all other forms of communication, independent of point in process. Besides this general pattern, group A primarily communicated by 'email', group B by 'sms', and group C by 'email', 'sms' and 'Messenger'[91].

[90] The frequency of communication in Figure 9.1 signifies how often group members are in contact with each other, *independent* of the specific form of communication shown in Figure 9.2. Hence, group members may be in contact 'more times a week', but they may only hold meetings on a weekly basis or more seldom with regard to the specific point in time.

[91] Messenger is Microsoft's instant messaging service providing the ability to exchange messages in real time with other people over the Internet.

	22.10				**19.11**				**17.12**			
	Mee-tings	E-mail	Tele-phone	Other	Mee-tings	E-mail	Tele-phone	Other	Mee-tings	E-mail	Tele-phone	Other
Group A	x	x		x sms	x	x			x	x		
Group B	x			x sms	x	x		x sms, Bibl-Net[92]	x		x	
Group C	x	x			x			x sms, Mes-senger	x	x		x sms, Mes-senger

FIG. 9.3. Form of communication based on question C1.3 in the process survey:

How do you communicate with group members (more x's are allowed)

The *planned meetings* served many functions in the groups, dependent on point in process. In the beginning of the assignment, meetings were generally used to brainstorm on and discuss the topic and focus of the assignment, e.g. to obtain a shared understanding: "…though we have exchanged thoughts on email, they were not interpreted as intended until we physical met…it clear up things"[93]. In the middle of the period, only *few* meetings were held in the groups due to the deadline of an assignment in *another* course involving new group members. However, the meetings held at this point still concentrated on focus formulation, choice of data collection methods and the development of a plan containing the central elements of the assignment. With regard to group A, three research questions were formulated and delegated - one for each group member - to start writing. In the final part of the process, meetings were primarily used to delegate parts of the assignment to individual group members (group B and C), to discuss the individual parts and try integrating them into a whole without loosing focus in order to produce a *collective* product.

In addition to the planned group meetings, another type of meeting were employed that we denote '*ad hoc'-meetings* (coded 'ad hoc-møde'). These meetings were characterized by being very short and held 'on the fly', hence *unplanned*, and held between some or all of the group members depending on the situation. They were used

[92] BiblNet is an online meeting place for students at the Royal School of Library and Information Science – a forum for communication, exchange of information etc. at http://biblnet.dk

[93] Interview1, A1, P38:253.

to catch up on things, arrange when to hold the next meeting or plan what to do, e.g. immediately before or after a meeting with supervisor. Though these meetings concentrated on the work task, they were also found to serve a *social* purpose in 'gluing' group members together and cultivate the 'group spirit'.

The mix between *work task oriented* and *social activities* also characterized the *planned* meetings. According to B3, for example, their meetings started with a social activity, such as eating or talking about non-assignment issues[94]. They were almost too good at 'social talking' as she said, but ascribed that to the point in the process (midpoint) and the lack of specific deadlines settled in the group. Group member B2, in turn, was frustrated over the lack of meeting discipline, e.g. at their last meeting (midpoint) when one was 40 minutes late and the other was busy cleaning the house when B2 arrived. She would have prefered the group to be more effective, and were looking forward to working on an individual part of the assignment, hence being able to control the process herself. She suggested deadlines to be set which was accepted by the other group members[95]. At a later meeting, 'social rules' were established to hinder too much small talk[96]. Like group B, group C started out with 'social talking', an activity that tended to take up more time in the beginning of the process than later. Their meetings were not organized in any specific way – according to C2 is seemed unnatural because the group members knew each other well and "...maybe the creativity would get killed if doing so" [97].

Email was used by group A for administrative purposes and to distribute information and references to information, such as a link or something one wanted the other group members to see[98]. According to A3, email quickly took up too much time unless it was used for specific issues[99]. In the beginning of the process, email was used to exchange problem formulations made by each group member of group B in order to compare perceptions of focus and provide a foundation for discussion. Group B only used mail in

[94] Interview2, P49:256-263.

[95] Interview2, P50:200-208.

[96] Interview3, B1, P55:167-172.

[97] Interview2, P46:183-191.

[98] Interview2, A1, P48:162-166.

[99] Interview2, P32:327:344.

few occations for administrative purposes. Group C did not comment on their use of email, neither in diaries, nor in the interviews.

Messenger was primarily used by group C as an 'easy' *supplement* to physical meetings from the middle of the period to the end. In this way group members could "meet" with the group (or part of it), eventhough some may be at work. The meetings on Messenger concerned, for example, the discussion of parts of the assignment made by individual group members. Moreover, Messenger was used for very specific purposes, such as to arrange a meeting, catch up on things like status of writing or to inform the other group members about new information. According to C2, it was positive that you did not have to think about what to write when you were chatting, in contrast to the email system. The drawback was, however, that the chat was not saved, hence they could not go back and recall what the group had been discussing on Messenger[100].

SMS was only used for administration and short message distributions.

9.1.5 Cognitive aspects

9.1.5.1 Cognitive strategies

Various strategies were used during group work to stimulate the *cognitive processes* at the group level as well as at the individual level.

In the initial process of obtaining a *shared* understanding of the focus (the problem) and goal of the assignment, *mind-mapping* was used by all groups as a *meta-cognitive* strategy (planning and facilitating problem solving) and for *collective induction* (dissemination of ideas, knowledge etc.).

In *group A*, the generation of a mind-map started when A1 emailed her perception of the group's collective thoughts and ideas to the other group members. Based on that, A3 started generating new ideas, which she added to the printed email, wrote down literature suggestions and started to re-read literature from the course. Then her elaborated mind-map was send to the others – also as a way to 'push' it (the focus) in a direction that she found interesting, and to show her engagement [101].

[100] Interview2B, P46:203-235.

[101] Interview1A, P33: 163-169.

In *group B*, a mind-map was generated at one of the first meetings. The aim was to 'explode' and discuss the topic of the assignment, hence, get an idea of the focus and structure of the assignment. The information collected by the group was also discussed in this situation.

In *group C*, a mind-map was generated at a group meeting after each group member had informed the others about what she/he had been reading, searching and dooing since the last group meeting. The mind-map was used to 'explode' the topic - to visualize it – as a way to pin-point a focus and define the problem. The mind-mapping activity in it-self, made the group realize that more information was needed before a focus could be settled.

As another *collective induction* and *generative learning strategy* (social construction of knowledge), *information* was communicated, discussed, exchanged and shared at group meetings in the beginning and middle of the assignment period - primarily to help formulate a *collective* goal and obtain a *shared* understanding of the problem in focus. From the middle to the end, information was primarily communicated and discussed in relation to specific elements of the assignment, e.g. during reading of other group members' writings. These findings, as presented for each group below, also demonstrated the importance of *person related knowledge*, e.g. the acquaintance and expectations of other people as reliable information sources for problem solving.

In *group A*, information was communicated in the *beginning* for inspiration, but according to A3, no common information ground was established: "it [their knowledge] is more something that we have arrived at through reflection"[102]. In this situation, knowledge from other group members – the *external group memory* - formed part of the collective information ground. As pointed out by A1: "A shared understanding emerges while we talk"[103]. In addition to this, a table of contents or a model in a book was used by the group for further inspiration and clarification. *Later*, more information sources were shared among group members – some were read by all group members whereas others were communicated by one group member to the rest of the group in order to inform about the specific topic (part) of the assignment that she was in charge of (paradigmatic sharing). In addition, information deemed relevant by one group member with respect to a specific part of the assignment was communicated to the specific group

[102] Interview1, P33:287-290.

[103] Interview1, P38:103.

member in charge of that part (information giving and social sharing). At the *end*, information was primarily discussed in connection with the reading of other group members' writings or for preparation of a reference list in the assignment. According to A1, the other group members were good at listening and discussions in the group resulted in a new shared understanding that also enabled them to judge whether text or parts of the assignment were relevant or not.

At the *beginning*, each member of *group B* communicated to the other group members what she had been reading, and personal notes were exchanged. In addition, indexes and table of contents of *new* books were skimmed for idea generation and relevance judgement. If relevant information was found between meetings, this information was brought and discussed at the next meeting (strategic and paradigmatic sharing). At *midpoint*, central information was discussed with relevance to its implementation in the assignment, e.g. how it had been used and understood by each group member – in order to arrive at a collective product. Information read by only one group member was reviewed by her and suggested as part of their collective information ground, if relevant. The importance of having a collective information ground was also demonstrated by B2 during the second diary period. She was concerned about the other group members – if they would have read what the group had agreed upon next time they met; if not, she found this would hamper the effectiveness of the work task process[104]. Later, when parts of the assignment had been delegated to each group member, information was suggested and disseminated among and by group members according to its relevance to the delegated parts (information giving and social sharing) At the *end*, information was primarily used for checking information sources.

At the *initial* meetings in *group C*, read information and its relevance was communicated to the other group members to inspire, generate ideas and suggest methods for analysis (strategic and paradigmatic sharing). However, as C2 pointed out, it could be difficult if information had been read by only one group member at this point in the process, because discussions then were rooted in *different* understandings that would hamper rather than support the generation of a shared understanding[105]. For

[104] Diary2, P15:53-54.

[105] Interview1, P36:212-216.

example, she experienced difficulties in contributing properly to focus formulation, since the books she had been 'in charge of' turned out to be useless. The problem by 'differentiated reading of information' was followed up again by C2 in the last interview when she reflected upon the difficulties in this group work compared to the other group work just finished: "…we had been reading different things, hence knew different things…making it difficult to integrate what people had been reading into a whole"[106]. At *midpoint*, the focus changed remarkably, hence *new* information was introduced and thouroughly discussed, accordingly. At the *end*, two new articles were taken into account and discussed, but at that stage in the process, information was addressed primarily for the purpose of generating a reference list or for checking and verifying information sources – in line with the other groups.

In addition to the importance of the cognitive strategies mentioned above, *feedback* from other group members also played a role to the *individual* group member's cognitive process and the generation of a collective product. This is shown in Figures 9.4-9.6 of each group member's perceived importance of feedback from *other* group members. The dependence of feedback was, however, associated with different elements of the project assignment during the process. At the beginning, it could be feedback related to focus formulation, whereas later, feedback was typically related to the writings produced by each group member.

[106] Interview3, P56:368-376; 380-392.

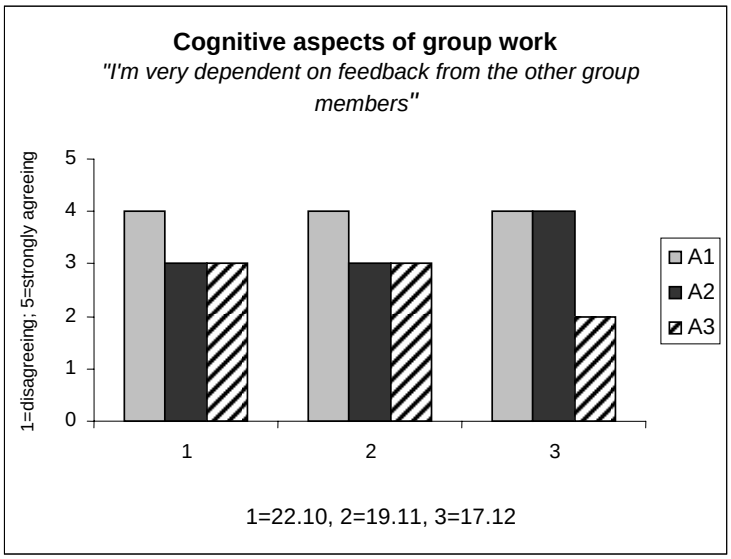

FIG. 9.4. Group member dependence of feedback from other group members in group A. Based on question C.2.1 in the process survey.

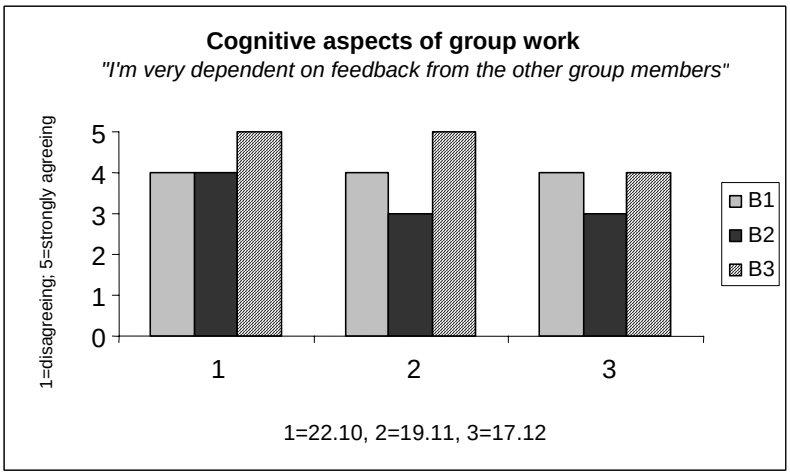

FIG. 9.5. Group member dependence of feedback from other group members in group B. Based on question C.2.1 in the process survey.

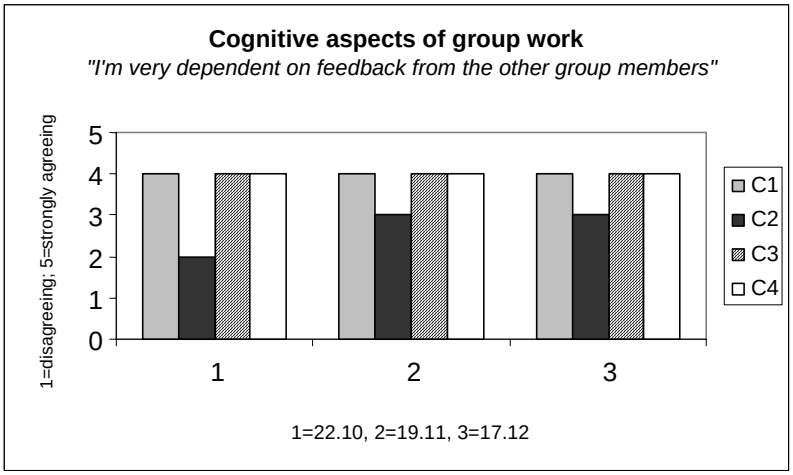

FIG. 9.6. Group member dependence of feedback from other group members in group C.

Based on question C.2.1 in the process survey

Despite group members' 'medium' to 'high' dependence on feedback *across* the process, several of the group members explicitely reported or reflected upon feedback issues in the *middle* of the process, which demonstated the cognitive *as well as* psychological importance of feedback.

In *group A*, group member A1 ran into problems at midpoint when she could not find a focus in *her* part of the assignment and, hence, needed the other group members to help her overcome the hurdle. In the second diary, A2 reported on the long time that had passed since their last meeting and that she needed to get some feedback on her writings, e.g. whether it was in the right direction and detailed enough[107]. A3 also commented on her need for feedback, but more as a reaction to their last meeting, where she did not get as much feedback on *her* writings as expected[108]. Though she claimed to be better at 'clevering' with others' writings than her own, she acknowledged, however, that feedback may be difficult to give due social reasons, e.g. fear of hurting other people.

[107] Diary2, P12:85

[108] Interview2, P43:199-219

In *group B*, B2 explicited at the second interview that she often missed feedback from the other group members regarding *her* writings and wondered if they actually had read the text.
In *group C*, the psychological role of feedback was demonstrated in an interview with C1 when she claimed that she needed to know if her direction was right, that is, whether the other group members thought *her* writings were all right[109].

The perceived dependence of feedback from other group members could also be seen as a result of the generally high cognitive authority group members seemed to constitute to one another, as shown in Figures 9.7-9.9.

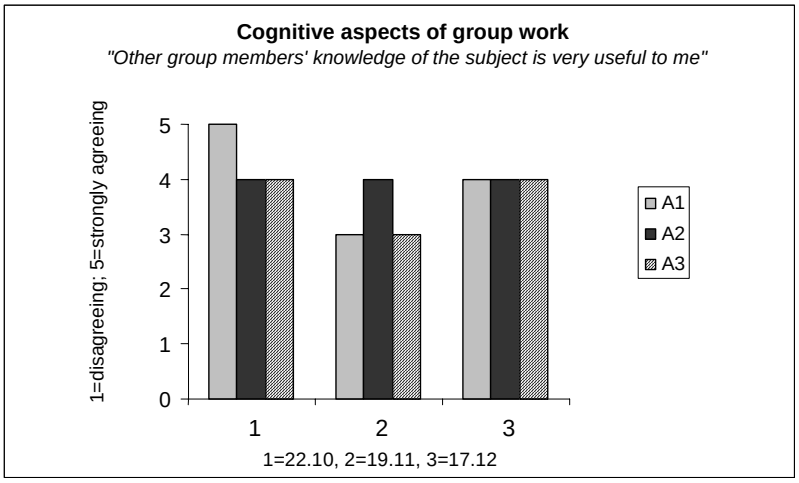

FIG. 9.7. Group member perception of the usefulness of other group members' knowledge in group A
Based on question C.2.1 in the process survey

[109] Interview1, P31:285-287.

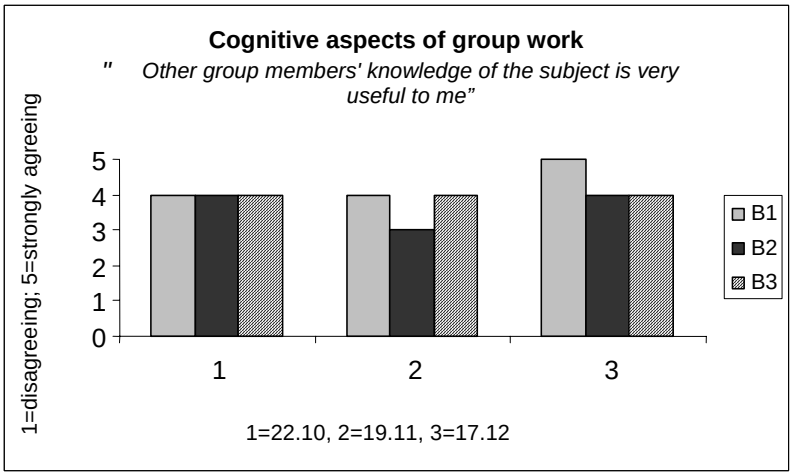

FIG. 9.8. Group member perception of the usefulness of other group members' knowledge in group B. Based on question C.2.1 in the process survey

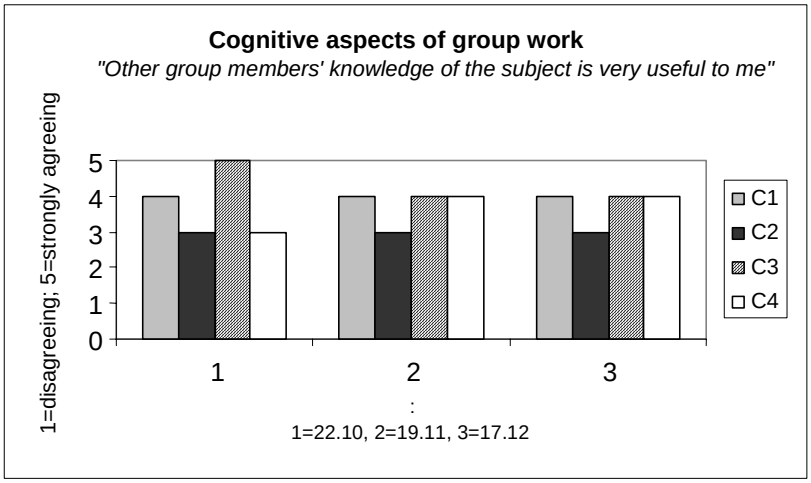

FIG. 9.9. Group member perception of the usefulness of other group members' knowledge in group C. Based on question C.2.1 in the process survey

Despite the relative high cognitive authority perceived by the individual group member, a minor *decline* could be seen at midpoint, if we add up all 'agreement' values across groups and for each period in Figures 9.7-9.9. This is demonstrated in Table 9.2. The minor decrease in perceived 'usefulnes' of other group members may be explained by

the fact that *another assignment* at another course was to be finished at that time, and further, that parts of the assignment had been delegated to individual group members, hence stimulating cognitive processes at the *individual level.*

Cognitive authority		
1 (22.10)	**2** (19.11)	**3** (17.12)
40 point	36 point	40 point

TABLE 9.2. Perception of 'other group members' knowledge' during time.
Values (1-5) for all groups have been added up (max=50).

In addition to the figures above, the perception of other group members' cognitive authority was also addressed as part of the first interview in connection with 'group formation' and 'successful groupwork'. Based on the participants' comments and explanations (previously presented), a *mutual* professional respect of one another was identified in the groups. This implied, for example, that suggestions and recommendations from other group members were *trusted* [110].

9.1.6 Role of group members

At a general *group level*, individuals in the role of being *'group members'* were found to serve many functions contributing to the construction of a shared cognitive understanding and a collective product. As indicated by the descriptions above, 'group member' activities and cognitive strategies in each group were characterized by dissemination, communication, exchange, discussion and feedback of information and personal knowledge. When looking at an *intra-group level*, specific roles were in some cases assigned to individual group members which turned out to affect group work – positively as well as negatively.

In *group A*, no specific roles seemed to dominate the group work negatively. A2 was generally good at keeping more perspectives open at the beginning of the process and keeping an overview at the end when the various parts of the assignment should be

[110] Interview1, C3, P37:195-199.

assembled into a collective product. A3 considered herself rather process-oriented, being fond of writing and quick at producing text, which is later addressed in the presentation of work task activities during time.

Despite the different natures represented in *group B*, no group members tended to dominate the others. According to B3, their working style was very different, but they were very keen on generating a collective product. However, she was not the one who took initiatives, but liked the others to show *her* the way. In stead, B3 possessed the 'secretary' function, e.g. implying that she wrote while the others were dictating from the manuscript what to write[111]. Due to the difficulties in administrating social talk at group meetings, the role of a 'whip' was invented and assigned to one group member in turn from the middle to the end of the assignment process.

According to C1, all four members of *group* C tended to have a dominating behavior, but everyone was listening to each other. Sometimes, however, she had a tendency to step down from group discussions. This turned out to derive partly from a negative atmosphere and disagreement in the group between her and C2. She found that C2 was taking too much responsibility and control over the product and acted as if it was *her* assignment. In addition, she was unsure about her status in relation to C2, and experienced an irritated attitude from her. C1 thought it could be related to her working style, being quite different from C2's. "She cannot understand how I work – I dilate on a subject, while she wants to keep focus…but if I change my working style, I simply loose my motivation too"[112] (C1). In addition to this, she felt that C2 did not consider her to be serious with her work. This conflict affected her relationship to C2 and her own well being in the group, though it changed for a while towards the end. At that point, C2 worked individually (and independently) on her part, while the rest of the group worked jointly on their parts. This resulted in a new dynamics in the group, which, in turn, also affected the mood by C1. According to C4, C2 had a more 'aggressive' working approach compared to the rest of the group, but did not consider her behavior as dominating, only as one that generated a bad consciousness. C2, on the other hand, was unhappy about her perceived role and behavior in the group, particular

[111] Interview3, P59:231-232.

[112] Interview3, P51:171-173.

towards C1, but most of all she was disappointed about the other group members' approach to group work – that they did not seem to prioritize it as much as she did. With regard to C1, she got irritated with her at a meeting in the beginning because C1 said something on their way out that - acoording to C2 – contradicted with all what *she* had been thinking and imagined about the assignment during the meeting. At midpoint of the assignment process, she regretted her behavior which she found too tough. In addition, she wanted to relax and change her attitude and behaviour towards the other group members, being tired of possessing a 'mother' role in the group. At one of the final meetings, however, she got a minor 'relapse', as she said, which was about to make her quit the group. Her own explanation was that she probably was the one who had changed most radically - from being the hearty person at the personal level to the very serious person at the work task level[113]. According to C2, it was this change in roles that had caused the problems in relation to the other group members.

9.1.7 Role of supervisor

During the three interview sessions, the supervisor was found to play a role in the process of construction in all three groups – both cognitively and emotionally[114]. This was, however, dependent on the point of the assignment process. At the *beginning*, the supervisor was generally used to discuss and guide focus formulation and control that the group was on the right track. In this connection, the importance of the supervisor's professional knowledge and his suggestions and recommendations of relevant documents (directive sharing) was stressed by several of the group members. In addition, his engagement was mentioned as a motivating factor by some group members. They used words such as 'inspirator', 'co-player' and 'discussion partner' to characterize the supervisor's role, particular at the beginning. In group C, information was also suggested later in the process, which turned out to help the group finish the assignment: "it was a big relief that it [the book] could be used to make the analysis…wouldn't have thought of seeking in that direction"[115].

The fact that the supervisor also had the role of 'examiner' turned out to affect the group members' behavior, particular in the last part of the process. For example, group B

[113] Interview3, P56:331-365

[114] Group A and B had the same supervisor. All supervisors were male.

[115] Interview3, C3, P57:36-37

talked about the importance of getting him to understand how *they* understood and perceived the focus of the assignment. For example, he used some concepts that made them feel uncertain about his understanding of the aim of their assignment and, more importantly, whether he *expected* something else. Another example derived from group A, where information suggested by the supervisor was accepted by the group, even though A1 disagreed with its relevance.

At the *end*, the supervisor was generally used to answer questions associated with formal assignment issues.

Besides these impacts from supervisor, a possible relation between group work and employment of supervisor was identified. For example, some group members said that they would have used the supervisor much more if they had been working on an individual basis, hence indicating that 'other group members' constituted some of the *cognitive roles* associated with the supervisor (e.g. inspirator, co-player and discussion partner) in contrast to working on an individually basis.

9.1.8 Affective aspects

Based on the diaries and process-surveys, the perceived experience of positive and negative feelings during time have been reported by each group member and further explored in the interviews. In this section, the focus will be on the affective aspects associated with group work, hence, indicating the *social* impact on group members' emotional experiences.

Figures 9.10-9.12 show the group members' perceived feeling of 'confidence', 'clarity' and 'uncertainty' at three points during the assignment period (start, midpoint, end).

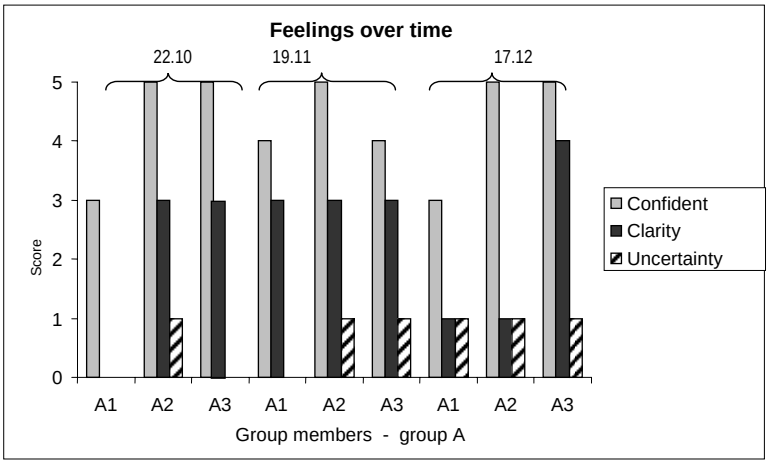

FIG. 9.10. Perceived feeling of 'confidence', 'clarity' and 'uncertainty' over time – Group A (0=not recognized; 5=high)

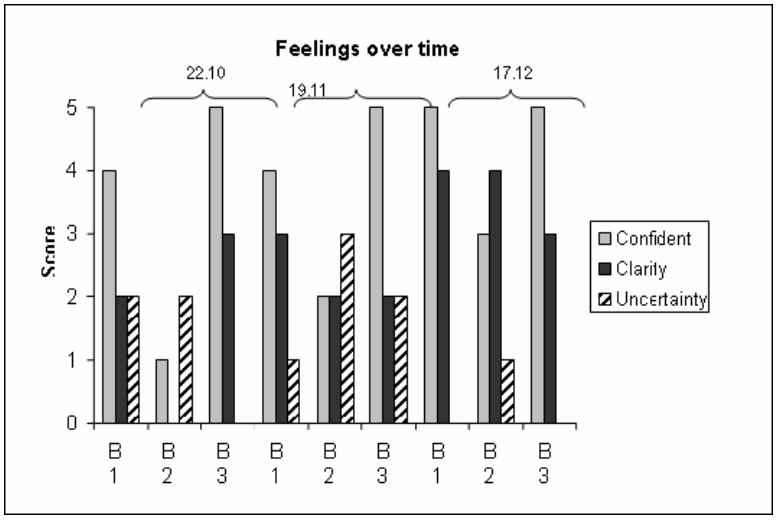

FIG. 9.11. Perceived feeling of 'confidence', 'clarity' and 'uncertainty' over time – Group B (0=not recognized; 5=high)

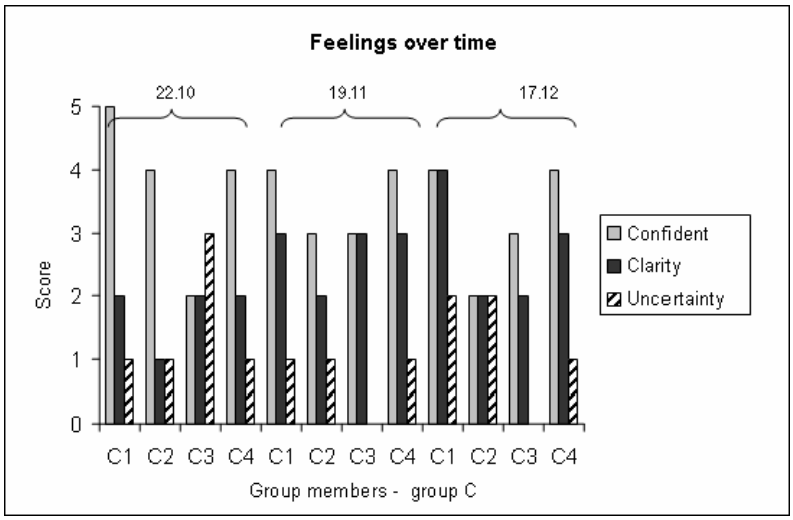

FIG. 9.12. Perceived feeling of 'confidence', 'clarity' and 'uncertainty' over time – Group C (0=not recognized; 5=high)

The perceived values of *clarity*, generally associated with cognitive work task aspects, were in general 'low' to 'middle' during the process, despite a significant increase by group B towards deadline.
This may indicate that focus had not been that clear to the group members at the point of reporting, not even at the last point, two weeks before deadline.

As can be further noticed, a general 'high' perception of *confidence* was experienced across group members during the process, if we add up the average group values on a scale from 0-5 for each period as demonstrated in Table 9.3. This should also be seen in connection with the general 'low' average group values of *uncertainty* during the process in Table 9.4.

Confidence			
Group	**1** (22.10)	**2** (19.11)	**3** (17.12)
A	4	4	4
B	3	4	4
C	4	4	3

TABLE 9.3. Group perception of 'confidence' during time.
Average values on a scale from 0-5 (max=5) for each process survey (1-3) and for each group.

Uncertainty			
Group	**1** (22.10)	**2** (19.11)	**3** (17.12)
A	0	1	1
B	1	2	0
C	2	1	1

TABLE 9.4. Group perception of 'uncertainty' during time.

Average values on a scale from 0-5 (max=5) for each process survey (1-3) and for each group.

One explanation for this may be the security derived from group member familiarity, which many of the group members mentioned had prevented them from feelings of uncertainty and stress.

Being satisfied with the process and the product also seemed to affect the individual's perception of confidence and certainty. For example, B3 said that because she was happy with and satisfied about the group process and the result, she could relax and avoid feelings of anxiety or uncertainty[116].

Looking at the *group member level*, some experiences may also be explained by the *individual* group members' personality. In group B, for example, B2 was generally perceiving a *low* level of confidence (though increasing during time), whereas B3 was perceiving a *very high* level of confidence throughout the process. In addition, B3 only perceived a low level of uncertainty at midpoint. According to the group member characteristics (Appendix 22), B2 is a person who tends to approach life with some anxiety and pessimism. Among others, she has temper, is very sensitive to stressful situations, such as a deadline in relation to the project assignment, and has a tendency to react with nervousness, uncertainty and frustration. B3, on the other hand, can be characterized as a calm person with a low temper, who generally has a very optimistic approach to life. Further, her low personality score on 'neuroticism' as shown in Table 9.1. seemed to correspond well to her low perception of uncertainty during the assignment.

A1 also demonstrated a low level of uncertainty – in this case at the end. According to her personality characteristics (Appendix 21), she is a calm, well-balanced and

[116] Interview3, P59:330-340.

characterized by a low degree of anxiety towards other people, though she also has a tendency to be anxious and worried in specific situations. She has an optimistic attitude towards life and an openness towards new knowledge and ideas, which may also be interpreted as an uncertainty orientation towards cognitive gaps. For example, she generally likes the first part of the project assignment when all possibilities are still open and challenging – in contrast to the individual information seeker in Kuhlthau's ISP-model. Hence, *intellectual curiosity* may explain her perceived low level of uncertainty.

In addition to group member familiarity, other social impacts on the *individual* group member's affective experiences were identified. In the first diary, for example, C1 claimed that *she* was less frustrated because the *group* as a whole had got more clarified and confident.

In the middle of the process, A1 reported that she had been very unhappy about her part of the assignment, but the other group members had helped her in getting over it by addressing it as a *collective* problem, hence *sharing* the 'problem' with her [117].

However, the group process was also found to affect the individual group member negatively. Due to the problems in group C, as described previously, C1 reflected in the third interview upon her emotional experiences: "If it doesn't work well in the group for some time, I strongly react on this. If there has been some stress situations, they haven't been tackled that well…it has intimidated me so I couldn't concentrate on the assignment,…it has overshadowed the process…I lost the control of the assignment…Sometimes I have resigned, sometimes I have felt they didn't respect me and then I lost my motivation and interest….Normally, I'm not uncertain about my professional competencies…it's a vicious circle…you stay aside, become a bit absent-minded, and then when you say something it may already have been discussed and the others don't understand it…We should have discussed the group problem earlier…The ownership of the assignment disappeared, …[it was] not as interesting as I had hoped…should have been more like *our* assignment"[118].

[117] Interview2, P48:74-78.

[118] Interview3, P51:87-96.

Taking the personal characteristics into account, C1 herself mentioned that she gets rather emotional affected when she works closely with other people in a group. According to Appendix 23, C1 is a calm person, but has also a strong tendency to experience negative emotions such as anger, bitterness, disappointment, stress and frustration. In general, emotional experiences are very important to C1 in the sense that she reflects upon, is affected by as well as concerned about any experience of negative or positive emotions.

The problems between C1 and C2 also seemed to affect the emotional experiences of C2. As shown in Figure 9.12, the decrease in her perception of confidence from 4 in the beginning to 2 in the end may be a result of this, in addition to her disappointment with the other group members' engagement in the assignment. If looking at her personality, C2 is a helpful person, generally trusting other people and aiming at being honest with them. However, she may also be perceived as a rough and dominant person by some people, for example in situations where her enthusiasm for a specific thing is not shared with others. In addition, C2 is an ambitious, competent and responsible person, who makes heavy demands on herself.

9.1.9 Summary of results on group work

This section has presented the results related to group member behavior, that is the *activities*, *cognitive* and *affective* experiences associated with *group work* at start, midpoint and end of the assignment process. In addition, group members' characteristics and perceptions of successful group work have been taken into account. The results have been addressed both at the group level and at the individual level, hence demonstrating similarities and differences across groups and across intragroup members.

According to the result of the personality test, group A was characterized by three group members possessing a very *similar* personality, whereas group B was characterized by three group members demonstrating a very *different* personality. In turn, group C was characterized by four group members who generally two by two or three by 1 had *some* of the same personality characteristics in common, hence no similarities *across* the group as a whole. The intragroup differences (group B and C) were among others reflected in their *different* approaches to group work and in their *different* working styles. In addition to this, group C in particular, experienced problems finding a *shared* focus of the assignment. If looking at the individual level, most of the group members

tended to be relatively sensitive to stress and uncertainty/nervousity (neuroticism), while at the same time demonstrating a positive attitude towards changes, intellectual curiosity and a willingness to think in unconventional ways (openness to experience). In combination with the low affective values of uncertainty and middle values of conscientiousness, this openness may also be seen as an *'uncertainty orientation'* towards *cognitive gaps*. This was for example reflected in the generally high affective values of confidence throughout the process. Hence, neuroticism may not in all cases be associated negatively with nervousity. The low affective levels of uncertainty seemed to be related to *'familiarity with other group members'*, which was associated positively with safety, confidence and relaxation.

'Familiarity with other group members' was also mentioned as the primary reason for *group formation* (not the topic or congruent interests). All group members knew each other in advance, though not in all cases from previous group work. 'Familiarity' was not only socially rooted, but was also related to work task factors, e.g. whether group members believed the other group members would possess the same ambitions, cognitive level, working approach, ethics and discipline as them. In addition to this, the importance of the cognitive outcome and collaborative processes were stressed by many of the group members. In addition to the affective implications of familiarity, it also meant that the groups generally tended to start group work at *another* development stage than the group development process prescribes - in this case at the 'norming stage'.

The importance of 'familiarity with other group members' also turned out to constitute an important social factor in *case study 1*. The group that experienced intragroup problems (group A) did not know each other very well in advance - from class or from previous group work. Hence, they experienced *mis-matches* in motivation and ambitions, and had difficulties in finding a shared focus. Though group work was preferred to working on an individually basis by all group members in group A (case study 1), these differences resulted in various negative feelings in the group, in particular regarding two of the group members. In this group (group A), group work started at the 'forming/storming' stages, but did not at any time seem to continue to the final and 'performing' stage of group work. This was found to affect the cognitive and affective experiences in the group accordingly. In turn, the other group (group B) in case study 1, knew each other very well in advance and did not experience any intragroup problems. Hence, in line with the groups in case study 2, this group seemed to start group work at the 'norming' stage.

In relation to the group work activities and processes of case study 2, various *cognitive strategies* were employed to stimulate the cognitive processes at the group level as well as at the individual level. In the initial process of focus formulation and in order to obtain a *shared* understanding of the focus (the problem), *mind mapping* was used by all groups as a *meta-cognitive* strategy and for *collective induction.* In addition to this, *information* was used as a *collective induction* and *generative learning strategy* by being communicated, discussed, exchanged and shared at group meetings in the beginning and middle of the assignment period. From the middle to the end, information was primarily communicated and discussed in relation to specific elements of the assignment, e.g. during reading of other group members' writings. The strategies also demonstrated the employment of various forms of *sharing*, e.g. social, strategic and paradigmatic sharing. Further, the importance of *external group memory* and *person related knowledge* was found, e.g. by the acquaintance and expectations of other people as reliable information sources for problem solving.

In a similar vein, information was communicated, exchanged and shared (strategic sharing) among group members in case study 1, particularly with the strategic aim of ensuring or providing for a *shared* understanding of the project focus. However, as group A had difficulties in finding a shared focus and as group B primarily used information from the course literature, no examples of paradigmatic and social sharing of information were seen in case study 1.

Group members in case study 2 also employed various *forms of communication*, which differed in form and in frequency across groups. *Meetings*, in particular the planned physical meetings, were, however, preferred to all other forms as a way to obtain a shared focus and understanding of the subject, (at start), to delegate parts of the assignment (at midpoint) and to collect the parts into a collective product (at end). In addition to physical planned meetings, short 'ad-hoc'-meetings were held 'on the fly' between some or all of the group members, often used to catch up on things. Further, digital meetings were held by group C as an easy supplement to physical meetings, particular from midpoint to end. It was used to discuss individual group members' manuscripts or for very specific issues, such as arranging a physical meeting. The drawback of digital meetings was, however, that the group discussions had not been saved, hence the group could not go back and recall what they had been discussing. Though meetings concentrated on the work task, they were also found to serve a *social* purpose in 'gluing' group members together into a *cognitive unit* and in cultivating the 'group spirit'.

In addition to the cognitive aspects, group members were found to constitute various *cognitive roles* to one another (e.g. inspirator, co-player, discussion partner and mediator), hence reducing the perceived need of the supervisor, in contrast to working on an individually basis. The supervisor was, however, employed at start and midpoint in particular, to guide focus formulation and the quality of the assignment. This was also associated with the supervisor's role as examiner, which implied a dependence of *his* acceptance of the final product. In this way, the supervisor was found to play a role in the groups' processes of construction – both cognitively and emotionally. In addition to the implications of 'roles', different roles were *positively assigned* by the groups to individual group members either for personal or for practical reasons. In turn, roles that were negatively assigned by the group or by the group member herself/himself affected group work accordingly. Particular within group C, perceived group member dominance, imbalance in assignment ownership and shifts between personal and professional roles were found to affect negatively and contribute to the personal conflict between C1 and C2. In that case, the behaviour characterizing 'storming' groups was identified.

With regard to the *affective aspects* associated with group work, *social impact* on group members' emotional experiences was identified. For example, a high level of confidence was identified deriving from the familiarity with other group members and the associated feelings of safetyness and security. This was further reflected in general low values of uncertainty. Many examples of the positive relation between social factors and affective experiences were seen. For example, the frustration perceived by C1 at start was reduced because the group as *a whole* had got more clarified and confident. Further, the frustration perceived by A1 due to lack of focus, was *reduced* by the group when it was addressed as a *collective* problem. In addition, B3 was approaching information *more* critically within the group than on an individual basis. Being satisfied with the group process and the work task product also seemed to affect the individual's perception of confidence and certainty. However, as already indicated, social factors may also affect negatively as shown by the personal conflict and problems in group C, e.g. leading to a decrease in motivation, interest and clarification with regard to group member C1 and C2.

Social factors were also found to affect group members' emotional behavior in *case study 1*. For example, the mis-match between intragroup members' understanding of focus, motivations and ambitions in group A often resulted in feelings of uncertainty, frustration and disappointment, also at the end as opposed to the ISP-model.

The affective experiences in case study 2 tended to be related to *personality*. For example, group members scoring high on neuroticism more often tended to experience feelings of stress than secure persons, and were generally scoring lower values of confidence.
Personality factors may also explain the difference in affective experiences in *case study 1*. Though group members were familiar with each other, group member B1 more often experienced feelings of uncertainty and frustration compared to B2. This was explained by B1 as a reaction deriving from lack of control with the end product. Personality factors were, however, not considered in the first case study.

9.2 Work task

This section presents the results associated with group members' *work task activities* and *cognitive* and *affective* experiences derived from the problem solving process of generating a collective product (the assignment). This is indicated by Figure 9.13, showing the *interaction* between the group member (or group) and the work task context in focus here (dark grey elements).

The section starts with a description of the various activities related to the work task process, e.g. how the subject was chosen and approached in each group, which activities applied to which point in the process and how these activities were performed – but collectively or individually. Then the cognitive aspects are presented, implying focus formulation and the cognitive strategies employed by group members during the work task process. Finally, the affective experiences derived from the work task, such as motivation and stress, are outlined showing differences and similarities across groups as well as across group members.

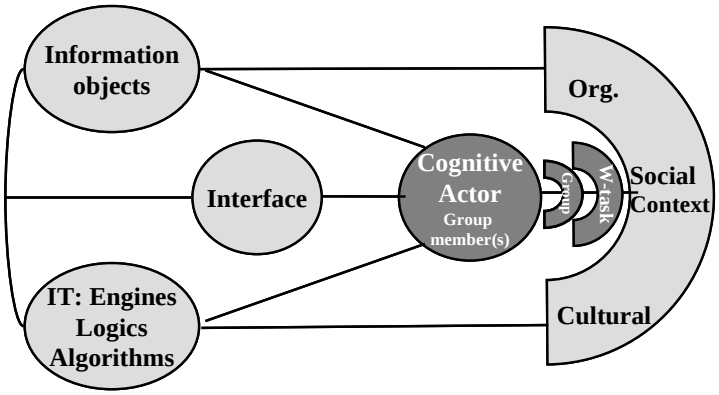

FIG. 9.13. Stratified Context-model of ‘real work task’.

The dark grey elements are in focus in Section 9.2. (— = interaction) Extended version of Ingwersen & Järvelin (2005).

9.2.1 Work task performance

In line with Byström (1997), the work task process has been divided into three main parts that correspond to ‘start’, ‘midpoint’ and ‘end’: 1) work task construction, 2) work task performance and 3) work task completion. In my view these process stages are all concerned with the work task as 'perceived' by the group or group-member.

The general sub-task activities associated with each group member and period are shown in Table 9.5-9.7 and based on the process surveys. The grey parts show activities that are performed by all group members at the specific moment in time. Information seeking (as an example of a sub-task activity) and has also been addressed specifically in section 9.3.

A.2.1 *What general project activity are you engaged on at the moment (more x's are allowed)*

	developing a project plan	searching information	reading information	planning data collection	data collection	data analysis	interpretation of results	writing	finishing the assignment	other 1	other 2	other 3
22-10-2004												
A1	X	X	X	X								
A2	X	X	X									
A3		X	X							X		
19-11-2004												
A1	X	X	X	X								
A2	X		X	X	X	X		X				
A3		X	X	X	X	X	X	X				
17-12-2004												
A1			X			X		X				
A2		X	X				X	X				
A3			X				X	X	X			

TABLE 9.5. Work task activities – group A.

The number above the group member column refers to the number in the process survey, e.g. A.2.1 refers to *Project assignment, Project activities, General.* The grey parts show activities that are performed by all group members at the specific moment in time.

A.2.1 *What general project activity are you engaged on at the moment (more x's are allowed)*

	developing a project plan	searching information	reading information	planning data collection	data collection	data analysis	interpretation of results	writing	finishing the assignment	other 1	other 2	other 3
22-10-2004												
B1		X	X									
B2	X	X	X							X		
B3	X	X	X									
19-11-2004												
B1			X									
B2			X									
B3			X									
17-12-2004												
B1							X	X	X			
B2						X		X				
B3								X	X			

TABLE 9.6. Work task activities – group B.

The number above the group member column refers to the number in the process survey, e.g. A.2.1 refers to *Project assignment*, *Project activities*, *General.* The grey parts show activities that are performed by all group members at the specific moment in time

A.2.1 *What general project activity are you engaged on at the moment (more x's are allowed)*

	developing a project plan	searching information	reading information	planning data collection	data collection	data analysis	interpretation of results	writing	finishing the assignment	other 1	other 2	other 3
22-10-2004												
C1	X	X	X	X								
C2		X	X									
C3	X	X	X									
C4		X	X									
19-11-2004												
C1	X	X	X	X						X		
C2			X									
C3		X	X	X								
C4			X							X		
17-12-2004												
C1				X		X	X					
C2			X					X				
C3								X				
C4								X				

TABLE 9.7. Work task activities – group C.

The number above the group member column refers to the number in the process survey, e.g. A.2.1 refers to *Project assignment, Project activities, General.* The grey parts show activities that are performed by all group members at the specific moment in time

As can be seen, some *activities* across groups and group members were carried out by *all* group members[119], whereas others were performed by only one or some group members. If looking at the *common* activities, the first period was primarily characterized by planning, information searching and reading activities, the second period was characterized by reading activities and the third and last period by data analysis and writing activities. If looking at the *individual* activities (activities that were performed by one or some group members), the divergence in group member activities at midpoint and end, in particular, was partly related to the administration of the assignment. According to this, parts of the assignment were delegated to individual group members to be continued on an *individual* basis, which generally took place between the second and third period in connection with the beginning of writing on the assignment. In addition to this, a deadline at midpoint on another project assignment (in another course and with other group members) implied that the group members did not concentrate on the present assignment, hence resulted in a more fragmented group work at this point, implying more *individual* activities.

Again, it should be noted that the results above derive from the process surveys, showing activities and behavior 'at the moment'. When looking at the diary and interview data, a more nuanced picture of the delegation and 'individual' processes can be stated.

In *group A*, parts of the assignment were delegated according to three formulated research questions. The first two questions were delegated to A2 and A3 and represented *normal decision* tasks, implying primarily the use of facts and background information. In contrast, the last question that was delegated to A1 represented a *genuine decision* task due to which no information requirements could be characterized in advance. The implications of this was among others that A2 and A3 started writing before A1, who, in turn, had difficulties in finding a focus in her part. This was perceived as frustrating by A1, but after discussing this with the other group members and due to the finding of one central information source, she finally reached a focus that hereafter guided the rest of the process. For example, it implied that new adjustments

[119] Though the same activities were performed by *all* group members in a group, it did not necessarily imply that group members were performing these activities *together* or on a *collaboratively* basis.

were made to the writings by A2 and A3. Besides the perception of frustration derived from the lack of focus, the delegation of one specific part also implied an opportunity for A1 to become absorbed in the subject[120]. According to A2, though, it also required an acceptance of *not* having the *whole* assignment in the head, but only a part of it[121]. Though group meetings were held and writings were exchanged between group members while working on an individual basis, the division of the assignment at midpoint also seemed to constrain the analytical writing task associated with the last part of the process. For example, according to A2 the *collaborative* writing of the analytical part of the assignment turned out to be rather difficult to write due to a lack of discussion of it in the group prior to this: "… if we had discussed it [the analytical part] more thoroughly in advance it would have been easier to write it without frustration"[122].

At midpoint, *group B* had generated a plan for the assignment, but had difficulties in delegating out specific parts of the assignment to individual group members. Though three parts were identified, they posed so different intellectual challenges that a straight delegation did not seem fair. According to B2, this could also result in differentiated marks[123]. Hence, it was decided that each group member should write on each of the three parts, constituting the whole assignment. To prevent a major overlap in their writings, a *detailed* plan was developed, due to which different subsections were delegated to group members. The three sub-tasks were characterized by various levels of complexity, that is, a descriptive part constituting a *normal decision* task and two theoretical and analytical parts each constituting a *known genuine decision* task. The relevant information needed to write each of the parts was found by the group before delegation, but not until midpoint, a *goal-oriented* reading was initiated.

As *group C* had difficulties in finding a focus, and was split up at midpoint due to the other assignment, the delegation of specific parts did not take place until the last part of the assignment process. During this process, four parts of the assignment were identified – one for each group member that each represented a *known genuine decision*

[120] Interview2, P48:182-194.

[121] Interview2, P43:111-127.

[122] Interview3, P52:79-87.

[123] Interview2, P50:388-392.

task. C2 was assigned to a theoretical part whereas the others was assigned to three analytical parts. Though writing was performed on an individual basis, the division implied that C2 worked alone on her part, while the others cooperated on their parts to ensure a consistent analytic approach. In addition to the personal problems between C1 and C2, this division of group work was also found to affect the emotional experiences by C1 and C2. Whereas C1 found that the division that a new dynamics had returned to the group[124], C2 started to perceive the group as 'me' and 'them'[125], which lasted throughout the process. In the final interview, C2 reflected on the ownership of the assignment and stated that it probably more was *her* product than the group's product, which she did not feel happy about[126]. This corresponds to C1's perception of ownership, as mentioned in the last result section on group work.

9.2.2 Cognitive aspects

This section presents cognitive aspects of work task performance, e.g. the construction and employment of declarative and procedural work task knowledge and skills.

9.2.2.1 Topic selection

Since group formation took place *before* topic selection, group work generally started with no knowledge of the work task content. Hence, *topic selection* was the first sub-task to be carried out by the groups. Due to course participation, some of the group members had been thinking about relevant topics prior to group work (A1, A2, B2, C3 and C4); but most of them found it difficult, even frustrating to decide which topic to select: "There are so many possibilities – almost too many", as B2 said[127]. However, by *brainstorming* on relevant issues according to the formal requirements and by *discussing* various 'problems' of interest, all groups arrived at one topic that everyone in each group could agree on and find interesting. In addition to the discussions based on group members' *declarative domain knowledge and social interaction*, various

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[124] Interview3, P51:127-140.

[125] Interview3, P56: 151-175.

[126] Interview3, P56: 303-312.

[127] Reply given in an email by B2 on a question sent to all group members as a follow-up after the final interview: "*Describe how you felt prior to the start of the project assignment, that is, before group or topic was chosen"*

sources of *background information* were employed during the *initial* process of topic selection. The topics chosen by group members were: TV2-Charlie – a new Danish TV channel for 'old' people' (group A), 'Reality TV and identity' (group B) and finally 'Turism and cultural heritage' (group C). Due to the participants' profiles (Appendix 15), they only had little or some knowledge of the subjects at the outset.

9.2.2.2 Focus formulation

In line with Kuhlthau (1993), each group member's formulation of the assignment subject in each of the three process surveys was assigned a number from 1 (weak) to 3 (strong) to indicate the perceived degree of focus in the formulations. Subject is here equivalent to 'problem' description. The general principle was that if the subject was described in rather broad and *general terms*, the text was given a '1'; if the subject was described in *specific and exact terms*, the text was given a '3. The result is shown in Table 9.8. The same procedure was used in connection with the interviews, with respect to that part of each of the three interviews that concerned the group member's descriptions of the assignment.

Group member	**22.10**	**19.11**	**17.12**
A1	2	2	2
A2	2	2	2
A3	1	3	3
B1	1	2	3
B2	1	1	3
B3	2	2	3
C1	1	1	2
C2	1	2	2
C3	2	2	3
C4	1	2	2
Sum	**14**	**19**	**25**

TABLE 9.8. Degree of focus in group members' subject descriptions in process survey 1-3 (1=weak, 3=strong; max=30 across group members).

In general, the degree of focus increased during the process, both when looking across the individual group members and across groups. The descriptions in the first process survey were often very broad and without a clear goal, while the descriptions in the second and third process survey tended to be more focused. The same tendency was seen in the interview data. In addition to this, the formulations in the first interview were generally related to the *motivations* for topic selection, whereas the second formulations were related to the group members' understanding or decisions regarding

the *structure of the assignment* and specific elements. Finally, the last formulations concentrated on the specific '*problem*' in focus.

Though, more of the participants' descriptions have been assigned the same degree of focus across time, the subject being referred to may not be the same. In more cases, the subject was reformulated or the object of interest changed across process surveys, without affecting the degree of focus. The form of the process survey itself may, however, be a constrain to the determination of focus, indicating that focus determination *solely* based on short written formulations is difficult. In this case, the interviews proved valuable to nuance the group members' focus formulations[128].

Besides determining the degree of each group member's focus formulation over time, the formulations have also been compared across group members to get an impression of the *collective* and *shared* intra-group understanding of focus.

In *group A,* the title of the project assignment stayed the same throughout the process. In addition, the descriptions generally reflected a shared understanding of focus, though group member A2 tended to have a slightly different perception of the object of interest.

In *group B,* the situation was the same, meaning that the title of the project as well the group members' perception of focus tended to stay the same throughout the process.

In contrast to group A and B, *group C* demonstrated more divergences, both in titles and in perceptions of focus across group members.
One explanation may be that group C changed subject and object of interest several times during the project assignment period. In addition to this, work task motivation was found to differ between group members, which may have affected their engagement in focus formulation accordingly. Work task motivation is further described in section 9.2.3 in relation to affective aspects of work task behavior.

[128] The difference between written and oral focus formulation can be transferred to the reference work situation, where patrons' information needs may be formulated either to a virtual reference service or to an librarian for further interviewing and negotiation.

At the end, the supervisors were asked to state their perception of focus of the final products (assignments) with a value from 1 (weak) to 3 (strong). As can be seen in Table 9.9, the perceived degree of focus in group members' formulations (Table 9.8) was also reflected in the supervisors' perceptions of focus of the final assignment.

Focus perception		
Group	**S1**	**S2**
A	3	
B	3	
C		3

TABLE 9.9. Supervisors' perception of focus in the final assignment.
(S1=Supervisor 1; S2=Supervisor 2; 1=weak; 3=strong).

Another aspect of focus formulation was *time*. Though operating with a start, midpoint and end due to the *formal* length of the project assignment, it turned out that this division of the process did not match the group members' *experience* of points in process.

Based on the diary data, for example, it turned out that the *other project assignment* had implied a pause in the present group work. This was followed up in the second interview at midpoint by asking each group member at what point in the process they perceived the group to be. Without exception, all group members answered "at the end of the initial part", still generating ideas and looking for a focus. Though focus had been discussed and information seeking had taken place prior to the 'other assignment', more of the group members did not feel they really could start the present assignment, before the other assignment had been handed in (at midpoint). According to C2, the other assignment took up resources, both in time and mentally[129], implying that no time was spent on the present work. Further, the pause implied that the groups in some way had to start all over again when they resumed the group work. In addition to the impact on the cognitive activity, the other assignment also affected group members emotional

[129] Diary2, P18: 17-18.

experiences with regard to stress, frustration and motivation. This is further described in section 9.2.3. on affective experiences.

9.2.2.3 Cognitive strategies

In addition to *communicating, discussing*, *exchanging* and *sharing* information, knowledge construction was also provoked by work task strategies such as *reading* and *writing*. These strategies differed, however, according to the point in the assignment process.

Reading at the *beginning* of the process concentrated on the skimming of information for topic exploration and focus formulation, on the reading of drafts from group members on possible 'problem formulations' to go into the assignment (group A), and on the reading of background information (groups B and C). From *midpoint and forward*, reading was associated with a more focused reading of theory to build up a common knowledge base and to prepare for the writing of the delegated part of the assignment. In connection to this, the development of a plan of the assignment served as a *metacognitive* tool that helped the group members goal-orient their reading[130]. In addition to that, the delegation of specific parts further stimulated a goal-oriented reading. At the *end*, reading was associated with the reading of theory and personal notes while writing on the delegated part. Further, a critical reading of group members' writings was performed with the constrution of the *collective* product in mind.

Writing in the *first part* of the work task process was associated with personal note taking in relation to the reading of information sources, e.g. in order to communicate the essence of the information to the other group members. In this way group members' were engaged in writing down and reflecting upon issues from the literature that might be relevant to the selected topic. In the *second part* of the assignment process, group members started to write on the delegated parts concentrating all their thoughts on these parts, resulting in a *differentiated* work task knowledge across group members. At the *end*, writing was still performed on an individual basis; but towards 'closing of group work' writing was done together (sitting in the same room) to integrate the various parts into a whole.

[130] Interview2, C1, P41:55-63.

When asked about the importance of writing in the second interview, most of the group members associated writing with 'having started the project', e.g. as formulated by A2: "…the feeling of having written a few pages and getting something down on paper…I'm up and running"[131]. In addition, writing was pointed out by C1 as one explanation for why the finding of a focus finally had been found in group C: "…we had to put it [our thoughts] down on paper; previously you could sit and just talk about it, which was good, however, but focus did not occur until we had to make an assignment out of it [thoughts]…The final sequence of group members' parts did not appear until they were put together"[132]. The *physical* manifestation of the assignment was also found to be associated with emotional experiences. For example as B2 stated, it helped her recognize how well the project was progressing and reduced the feeling of stress accordingly.

9.2.3 Affective aspects

In this section, the focus will be on the relation between affective aspects and the work task, hence indicating the *contextual* impact on group members' emotional experiences.

Despite the increase in degree of focus according to the process survey and interview data, this tendency did not seem to be reflected in the groups' perceptions of *clarity* as stated in the diary at start, midpoint and end. As shown in Table 9.10 (in addition to the affective experiences drawn from the process surveys and shown in Figures 9.10-9.12), the average group values for 'clarity' only *increased* from 'low' to 'high' for group B, whereas a slight *decrease* in clarity was identified by group A and C towards the end. The low degree of clarity at the beginning as perceived by group B was partly associated with a doubt by B2 in whether the selected topic only would amount to little[133]. This is further demonstrated when looking at the average diary values for clarity on an *individual level (appendix 25)*. Here the values for B2 at start, midpoint and end are: 0 point, 0 point and 4 in comparison. In turn, the relative high degree of clarity in the beginning of the process for group A was explained by A2 in the first diary as a confidence regarding the work task process and the finding of relevant

[131] Interview2, p42:73-77.

[132] Interview3, P51:23-43.

[133] Diary1, P5:25-27.

information[134]. The lower value at the end may be associated with the fact that the group was in the middle of finishing the assignment while the third diary was kept.

Clarity			
Group	**1. diary**	**2. diary**	**3. diary**
A	24	19	22
B	13	9	25
C	15	15	14

TABLE 9.10. Group perception of 'clarity' during time.

Average values on a scale from 0-5 for each diary period (7 days) and for each group (max=7x5=35).

The perception of *motivation* did not seem to be associated with focus formulation either. If looking at the average group values for 'motivation' in Table 9.11, motivation was generally high at start but decreased at midpoint and towards the end, especially with respect to group A and group C.

The general high values at start was explained by the group members as relating to curiosity regarding the topic and positive expectations regarding the group work. The high values at end was often associated with the intensive spirit up to deadline and the expectations of the impending ending of the assignment. The fall at midpoint was primarily due to a falling-off after the other assignment (A3, B1, B2, C1, C2 and C3), and the decrease towards the end was explained by a decrease in subject interest concerning the delegated part (A2, A3 and C3) in addition to a loss in motivation derived from the interpersonal problems in group C (C1, C2).

Motivation			
Group	**1. diary**	**2. diary**	**3. diary**
A	29	22	23
B	23	16	24
C	24	20	18

TABLE 9.11. Group perception of 'motivation' during time.

Average values on a scale from 0-5 for each diary period (7 days) and for each group (max=7x5=35).

[134] Diary1, P2:29-31.

With regard to the lack of interest in the topic, A2 and A3 found that their delegated parts (descriptive parts) were boring, while C3 directly explained her lack of energy in the present group work with a lack of interest in the topic: ” Working energy derives from a burning interest in the topic or subject …I haven't been doing that much creative thinking during this group work”[135].

With regard to group B, the motivation at start and at the end should be seen in connection with the perception of motivation by B3. As can be seen in Figure 9.14, B3 generally were highly motivated, particular at the beginning and at the end, whereas B2 generally demonstrated lower values over time, though her behavior followed the same pattern as B3, that is, with a decline in the middle of the period[136]. As pointed out in the presentation of affective experiences associated with the group work process, the difference in experience of motivation in group B may also be explained by group members' difference in *personality*. As shown previously (and shown in Appendix 22), B3 has a very optimistic approach to life and is very open to experience, whereas B2 is a person who tends to approach life with some anxiety and pessimism. In addition, a tendency to react with nervousness, uncertainty and frustration may have prevented her from experiencing high values of motivation. Personality may also explain the difference between group B members' perception of 'stress', which is shown later in Figure 9.16.

[135] Interview3, P57:68-84.

[136] When adding up the values across time for each group member, B2 scores *54 point* and B3 scores *80 point* (max=105)

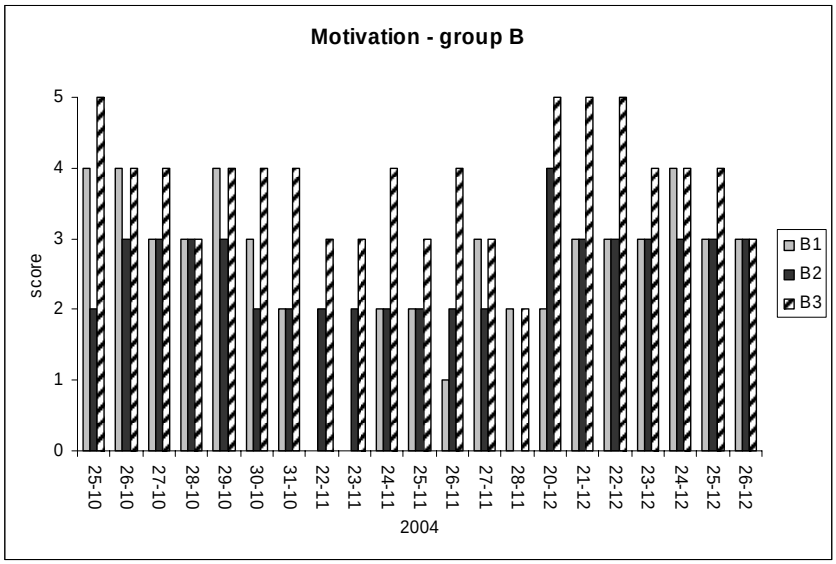

FIG. 9.14. Perceived feeling of 'motivation' over time – Group B.
Values on a scale from 0-5 for each group member and for each diary period (7 days) at start, midpoint and end.

The result of lack of interest by C3 and the personal conflicts between C1 and C2 can also be seen in Figure 9.15, showing group C and its members' motivation during time. If looking at the final period only, C1 scored *20 point*, C2 scored *17 points* and C3 scored *19 points*, if adding up the values for each group member (max=35).
According to C2, her decrease in motivation was explained by "the funny project that turned into the what-are-we doing-project". She did not feel that the other group members were that engaged in the project:"…but you cannot force other people to be motivated, can you" [137].

[137] Interview3, P56:187-196.

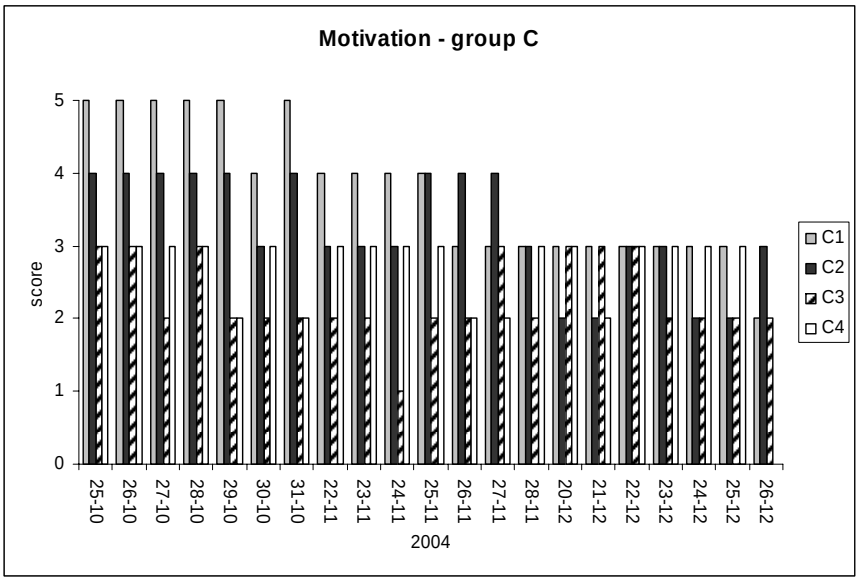

FIG. 9.15. Perceived feeling of 'motivation' over time – Group C. Values on a scale from 0-5 for each group member and for each diary period (7 days) at start, midpoint and end.

In addition to the motivation factors associated with the work task (e.g. topic of interest) and with the group work process (e.g. conflicts), information related factors also seemed to affect group members' perception of motivation. For example, C1 mentioned that the finding of a relevant book had motivated her, e.g. into continuing her reading[138]. Group member C3 stated in the first diary that motivation increased when it turned out that all the relevant material they had searched actually was available, meaning that they did not have to wait for several weaks before it turned up[139]. Also B1 stated that the reading of literature had got her back on the track again[140].

Another emotional experience related to the work task was *stress*. In this case, no general pattern could be identified *across* groups when looking at the average group

[138] Interview1, P31:209-221.

[139] Diary1, P9:53.

[140] Interview2, B1, P45:387.

values on ‘stress’ for each diary period in Table 9.12. Where stress increased for group A and C towards deadline, group B seemed to experience a sudden decline in stress.

Stress			
Group	**1. diary**	**2. diary**	**3. diary**
A	7	5	9
B	13	15	3
C	8	14	13

TABLE 9.12. Group perception of ‘stress’ during time.
Average values on a scale from 0-5 for each diary period
(7 days) and for each group (max=7x5=35).

Besides deadline, a pause or stagnation in group member activities was mentioned by many as a factor that provoke experiences of stress. Hence, the slight increase in stress at midpoint for all groups could be seen as an reaction to the other assignment implying no activity on the present assignment. From midpoint, the implications of writing was mentioned by many group members, meaning that writing helped reduce stress. In turn, it could also easily provoke stress if *no* writing activity had taken place for a while, both at the individual and at the group level, as C2 said: “You have nothing until you have written it on paper”[141] . The development of a *plan* showing in detail the content of the assignment also had a stress reducing effect, though only showing the assignment at a meta level. According to B3, for example, the plan further enabled the group to measure how far they had reached[142].

If looking at the experience of stress as perceived by group B members and demonstrated in Figure 9.16, only low values of stress can generally be identified, particularly at the end. However, whereas B2 experienced stress during the whole process, B1 and B3 only perceived values of stress until midpoint, B3 even very low values of stress. This difference in perceptions may again be seen as an example of differences in personality, due to which B2 more easily reacts with anxiety and stress

[141] Interview1, C2, P36:171-179.

[142] Interview2, B3, P49:167-179.

compared to the other group members. The sudden decline at the end was found to be associated with a high confidence due to the work task process and a high satisfaction due to the work task product.

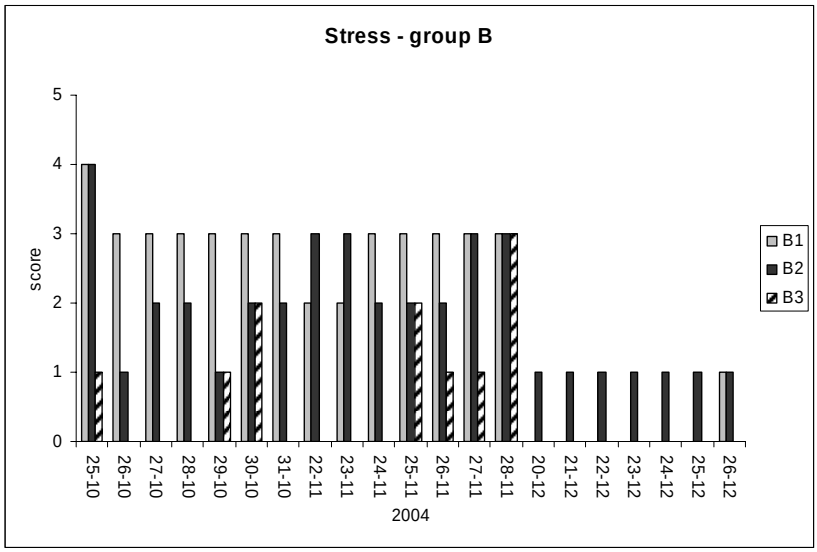

FIG. 9.16. Perceived feeling of 'stress' over time – Group B. Values on a scale from 0-5 for each group member and for each diary period (7 days) at start, midpoint and end.

Another feeling associated with the ending of the assignment was *relief*. However, as can be seen in Table 9.13 of the average group values of 'relief' for each diary period, only group B perceived a high degree of relief towards the end (which was shared by all group members).

Relief			
	1. diary	**2. diary**	**3. diary**
A	16	10	13
B	16	6	29
C	12	7	13

TABLE 9.13. Group perception of 'relief' during time. Average values on a scale from 0-5 for each diary period (7 days) and for each group (max=7x5=35).

Regarding group A, group member A2 in particular did not demonstrate high values of relief, as shown in Figure 9.17. This may again be explained by the fact that the group was in the middle of finishing the assignment when the last diary was kept, also reflected in Table 9.12 by an increase in ‘stress’ towards the end. This could again be associated with type of personality. Due to the personality test, A2 has a tendency to be anxious and upset in stressful situations. In addition to this, she generally found that finish writing and making a ‘closure’ was difficult, which may also have affected the feeling of relief negatively.

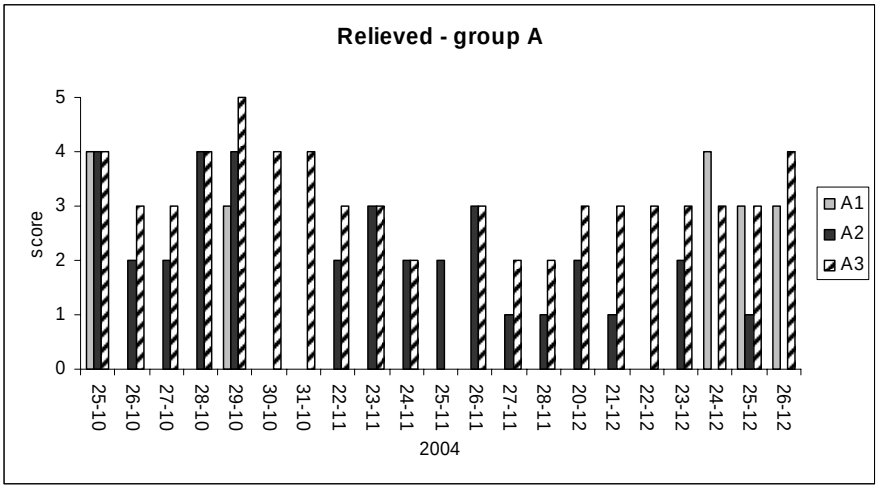

FIG. 9.17. Perceived feeling of ‘relief’ over time – Group A.
Values on a scale from 0-5 for each group member and for
each diary period (7 days) at start, midpoint and end.

In group C, group member C2 was very dissatisfied and unhappy about the result (in addition to the group work process), hence perceiving very low values of ‘relief’ as demonstrated in Figure 9.18. This corresponds well with her low perception of ‘confidence’ as presented in the preceeding result section on group work.

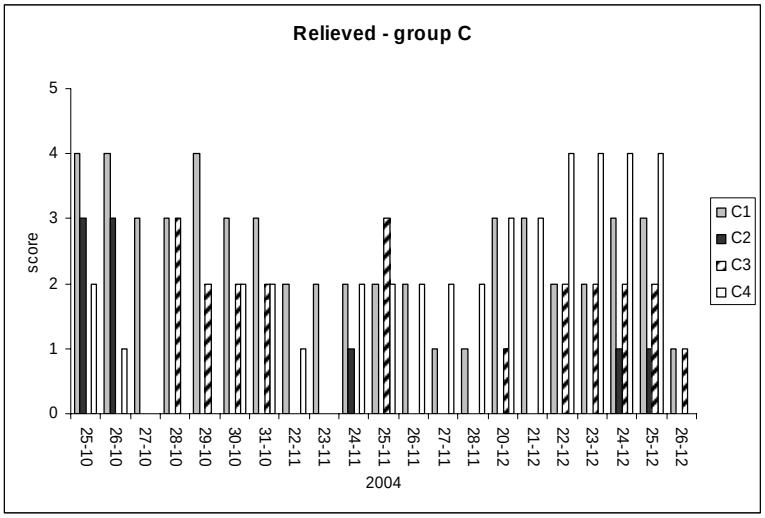

FIG. 9.18. Perceived feeling of 'relief' over time – Group C.
Values on a scale from 0-5 for each group member and for each diary period (7 days) at start, midpoint and end.

9.2.4 Summary of results on work task

This section has presented the group member *activities*, as well as the *cognitive* and *affective* experiences derived from the *work task* context.

In line with Byström (1997), the work task process has been divided into three task performance stages that refer to start, midpoint and end: work task construction, work task performance and work task completion. With regard to the problem solving process, this division corresponded to Vakkari's (2001) three stages of focus formulation: the prefocus stage, the focus formulation stage and the postfocus stage. It was found, however, that this division of sub-processes and stages according to *time* and the *formal* length of the assignment process, did not correspond to group members' *perception* of the stage or point in time. At midpoint, for example, most of the group members still found the group to be at the end of the construction and prefocus stage. This was primarily related to a deadline of *another assignment* that required the groups to suspend the present group work for a while. In addition to the involuntary pause at midpoint, the 'other assignment' implied that the groups almost had to start all over again, when they returned to the present group work. Further, the existence of another assignment parallel to the present assignment resulted in stress, frustration and a

decrease in motivation. The *perceived* midpoint, in turn, was by most of the group members associated with the initiation of 'writing' (on the assignment).
Information searching, reading and writing *activities* were performed throughout the process, but guided by different aims according to the specific work task stage. For example, the search for 'background information' and 'goal oriented searching' primarily took place at the prefocus and focus formulation stage, whereas 'writing on the assignment' primarily took place at the focus formulation stage and continued throughout the process.

This difference in work task activity according to work task stage and group members' individual subtasks (delegated part) was also identified in *case study 1*. In line with case study 2, searching decreased, whereas reading and writing increased during time. However, all three activities were performed *throughout* the process, though the aim of activity differed according to the specific work task stage, in line with case study 2. In this way it turned out that the searching activity was *not* replaced by 'writing', as the ISP-model suggests, but was performed *parallel* to information searching.

With regard to the *intragroup activities* at the various task performance stages in case study 2, it was found that activities in general were carried out in *common* at the construction and completing stages, whereas activities tended to be performed on an *individual basis* at the performance stage.
The *common* activities at the construction stage (prefocus) were characterized by planning, searching and reading activities, whereas the common activities at the completion stage (postfocus) were characterized by data analysis and writing activities.
The *individual* activities at the performing stage differed across group members. This derived from the involuntary pause at midpoint due to the other assignment *and* a division of the assignment into minor parts to be distributed among group members. The division of the work task into subtasks turned out to affect group work in more ways than the shift from collaborative to individual activity. It was found that the subtasks constituted the same characteristics and activities as the general work task. Hence, each group member had to formulate a focus, search information, read and write on an *individual* basis, which further turned out to constrain the construction of a *shared* focus of the *collective product*. In addition to the difference in subtask subject resulting in different work task knowledge, the different nature or complexity of the subtask also turned out to affect intragroup behavior. For example, group members that were

assigned to a *normal decision task* (e.g. a descriptive part of the assignment) had less difficulties in finding the subtask-focus, find relevant information and start writing than group members who were assigned to a *genuine decision task* (e.g. an analytical part of the assignment). Moreover, these differences in group members' subtasks were also reflected in *different* emotional experiences, e.g. in frustration as a reaction to subtask complexity and lack of focus.

As part of the *cognitive processes* at the prefocus stage, the *topic* of the assignment was selected by group members *after* group formation. This choice was based on strategies such as brainstorming as well as exchange and discussion of topics due to personal knowledge and sources providing background information.

With regard to *focus formulation*, a slight increase in focus was found in group members' focus formulations from start to end. In addition, the *content* of the three formulations were found to differ according to the point in process, hence the first considered 'topic motivation', the next the 'structure of the assignment' and finally, the last formulation considered 'the specific problem in focus'. In addition, intragroup formulations were compared for *similarities* and *differences* to get an impression of the *shared intragroup understanding* of focus. Only group C, shifting focus many times during the process, demonstrated divergences in focus formulations.
The *supervisors' perception* of focus of the final assignments was found to support the perceived degree of focus in group members' formulations at the end, hence showing a progress in focus formulationsthat corresponded to the cognitive progress demonstrated in the ISP-model.

In *case study 1*, group members' focus formulations were also found to *increase* during work task performance as demonstrated in the interviews and the supervisors' assessments of focus in the final product. However, a 'turning-point' resulting in positive feelings - due to focus formulation - was not experienced by group members at midpoint of the assignment process. This finding was in line with case study 2.

With regard to the *affective experiences* associated with work task performance in case study 2, no strong correlation was found between focus formulation and 'clarity', and between focus formulation and 'motivation', indicating that though focus formulations tended to increase towards the end, this was not reflected by an increase in clarity and

motivation simply because the group members did not *perceive* it that way. The general low perception of clarity during the process indicates that focus had not been that clear to the group members at the point of reporting. With regard to motivation, loss in motivation and interest was related to the 'other assignment', but also to individual factors such as interpersonal conflicts, the character of the delegated subtask and personality factors.

Concerning experiences of 'stress', no general pattern was identified across the groups. However, many group members mentioned deadline and stagnation in group work as stress provoking factors. In turn, writing on the assignment was mentioned by many as a stress reducing activity, e.g. provoked by the physical manifestation of the product. A sudden decline in 'stress' towards the end regarding group B was found to be associated with a high 'confidence' due to the work task and the final product. Except for group B, no high perception of 'relief' was identified in group A and C towards the end. This seemed to be related to individual factors such as dissatisfaction with the end product. In addition, the groups were at the completion stage when data on relief were collected, hence they had not finished the assignment yet, which generally implies experiences of relief.

Feelings derived from the work task process were also identified in *case study 1*. For example, 'stress' was perceived by some of the group members as deadline was approaching. In addition, feelings of 'disappointment' were experienced at the end due to the quality of the outcome. Further, as group A had difficulties in finding a shared focus in the assignment, low levels of 'clarity' were identified at the end, in contrast to the ISP-model.

9.3 Information seeking

As the last research dimension being reported, this section presents the results concerning group members' information seeking *activities* as well as *cognitive* and *affective* experiences during the assignment process.

As indicated by Figure 9.19, this section focuses on the individual group member's *interactive* information behavior, which implies various individual and collaborative activities and strategies according to the point in process, as well as various personal (e.g. the group), physical and digital information sources in connection to this. The cognitive aspects in this section concern group members' perception of relevance and

'enough information' as a way to describe information behavior in correspondence with their *cognitive* process of construction. The affective aspects address the emotional experiences associated with the finding of relevant information, and the use of information systems and literature. Group members' search task, person and group knowledge and skills will also be taken into account. In addition, aspects associated with *personality* will be taking into account in relation to the information seeking behavior of the individual group member.

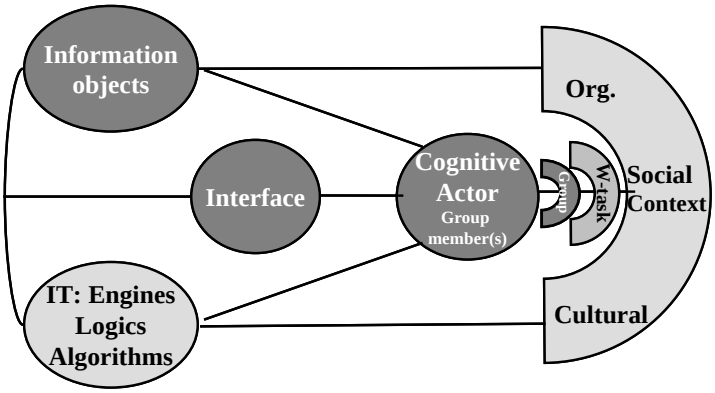

FIG. 9.19. Stratified Context-model of 'information seeking'.
The dark grey elements are in focus in Section 9.3. (— = interaction)
Extended version of Ingwersen & Järvelin (2005).

9.3.1 The information seeking process and activities

Table 9.5-9.7 showed the occurrence of group members' search task activities during *work task performance*, implying an *active search behavior* as conceptualized in chapter 2. According to these tables, information searching took place primarily in the beginning and at midpoint. If looking at Table 9.14-9.16 of group members' *information seeking activities* across the assignment process, a more nuanced picture of *information behavior* can be seen. In line with the work task activities, the type of information seeking activity differed according to the point in the process (start, midpoint and end). Moreover, some activities were performed collaboratively while others were performed on an individual basis, partly due to a shift in subtask and information needs at midpoint, e.g. from the collective to the individual information need The specific activities across and within each group are described more specifically after the table presentations. Besides the information derived from the tables, the descriptions are based on quotations from diaries and interviews, extracted

by the family code ‘INFORMATION SEEKING, STRATEGIES’. The grey parts are activities that are performed by all group members at the same specific moment in time.

B.1.1 *What kind of information task are you engaged on at the moment (more x’s are allowed)*

	identify information needs	formulate the specific subject	Identify the general subject	searching background information	exploring the subject (during the project assignment)	goal oriented searching	skimming information sources	searching specific information (e.g. bibliographical information)	talking with people who knows about the subject	re-checking information sources for new information	other 1	other 2	other 3
22-10-2004													
A1	X	X	X	X			X	X					
A2	X	X	X	X		X	X		X				
A3	X	X		X			X		X				
19-11-2004													
A1		X			X	X	X	X		X			
A2		X			X	X	X	X					
A3					X	X							
17-12-2004													
A1					X				X	X			
A2					X	X		X					
A3					X					X			

TABLE 9.14. Information seeking activities – group A.

The number above the group member column refers to the number in the process survey, e.g. B.1.1 refers to *Information seeking, Information seeking activities, Information tasks*. The grey parts show the activities that were performed by all group members ‘at the moment’ during time.

B.1.1 *What kind of information task are you engaged on at the moment (more x's are allowed)*

	identify information needs	formulate the specific subject	Identify the general subject	searching background information	exploring the subject (during the project assignment)	goal oriented searching	skimming information sources	searching specific information (e.g. bibliographical information)	talking with people who knows about the subject	re-checking information sources for new information	other 1	other 2	other 3
22-10-2004													
B1	X	X		X			X						
B2	X	X		X			X						
B3				X	X	X	X						
19-11-2004													
B1					X								
B2					X								
B3		X			X								
17-12-2004													
B1										X			
B2					X								
B3													

TABLE 9.15. Information seeking activities – group B.

The number above the group member column refers to the number in the process survey, e.g. B.1.1 refers to *Information seeking*, *Information seeking activities Information tasks.* The grey parts show the activities that were performed by all group members 'at the moment' during time.

B.1.1 *What kind of information task are you engaged on at the moment (more x's are allowed)*

	identify information needs	formulate the specific subject	Identify the general subject	searching background information	project assignment) exploring the subject (during the	goal oriented searching	skimming information sources	bibliographical information) searching specific information (e.g.	talking with people who knows about the subject	new information re-checking information sources for	other 1	other 2	other 3
22-10-2004													
C1	X	X	X	X			X		X				
C2	X		X	X			X						
C3	X		X	X			X		X				
C4			X	X			X						
19-11-2004													
C1		X			X								
C2					X								
C3					X	X	X			X			
C4													
17-12-2004													
C1					X			X	X	X			
C2	X				X	X			X	X			
C3								X		X			
C4										X			

TABLE 9.16. Information seeking activities – group C.

The number above the group member column refers to the number in the process survey, e.g. B.1.1 refers to *Information seeking*, *Information seeking activities*, *Information tasks.* The grey parts show the activities that were performed by all group members 'at the moment' during time.

When looking at the group level and *across* groups, the information seeking activities in the beginning of the assignment period were generally concerned with the *prefocus-stage*, that is, the 'initial subject formulation', 'identification of information needs', 'search for background information' and 'skimming of information sources'. At midpoint - or 'at the end of the initial part' as perceived by the group members - the groups were generally in the middle of 'exploring the subject'. Group A, however, was also engaged in 'goal oriented searching' implying a search for specific information. At the end, groups were still in the middle of 'exploring the subject' as part of the *focus formulation stage*, but were also engaged in activities typically related to the *postfocus-stage*, such as 're-checking information sources for new information'. Not surprisingly, most information seeking activities were performed in common at the beginning of the process in order to find a shared focus of the assignment, and before dividing the assignment into specific parts for further work on an individual basis. At midpoint, activities were more spread across group members, due to the delegation of specific parts and the pause in group work caused by the other assignment. At the end, group A and group C was still engaged in information seeking activities, which with regard to the latter derived from a sudden shift in focus.

When looking at the *intragroup* level, various information seeking activities could be seen that also demonstrates the *social dimension* of information behavior in groups. For example, search results and information was communicated, discussed, exchanged and shared among group members, as already touched upon in section 9.1 in relation to the *cognitive* aspects of group work. Below, the intragroup activities and processes in relation to *information seeking* are described.

At the beginning, each group member in *group A*, searched information on her own, but informed the others of relevant information, e.g. by sending links. Group member A1, in particular, was considered good at distributing information by the other group members. At group meetings, search terms were exchanged, both at start and at midpoint, and the relevance of information sources – searched or read - was discussed.
Later, when parts of the assignment had been delegated in the group, information was exchanged or distributed to specific group members if considered relevant. In addition to the impact on cognitive experiences, collaborative information seeking was also found to affect the work task product, itself. For example, A1 once brought one of 'her' information sources to a meeting to share it with the group. It later became one of the

central information sources, changing the whole structure of the assignment. In addition, this information source was often referred to in the interviews by the other group members when reflecting upon their delegated part of the assignment[143]. For example, A2 used aspects from the specific information source to perform a new search. In the same way, A3 searched the document in various databases to see the assigned keywords and make a new search in the systems. Most of the information in group A was found before the division of the assignment into delegated parts.

Most of the searching in *group B* was performed in common, that is, sitting in the same room, but each group member at her computer searching *different* information sources for practical reasons. During this process, the relevance of information was discussed and search expressions and keywords were exchanged. At meetings, in particular at start and midpoint, information was also shared and exchanged. For example, when information sources had been read, resumees and relevance assessments were given to the other group members, e.g. "…there is no reason why everybody should read the same, if one person can tell that it [the information] isn't relevant"[144]. However, information was read and interpreted collectively if it turned out to be difficult to understand[145].

At the beginning, group members of *group C* generally searched much of their information on a collaboratively basis, either by sitting at the same computer or by dividing the search between them, implying specific but *different* information sources (channnels) to be searched. Relevant search terms were exchanged, in addition to the ones that each group member found in 'his' or 'her' system. The relevant information was shared and exchanged during meetings, as previously presented in section 9.1. After midpoint and towards the end, searching was performed more individually, partly for practical reasons as the final focus was reached very late in the process, but also due to the delegation of specific parts of the assignment. However, information was still exchanged among group members if considered relevant. According to C3, being four group members in the group had resulted in more aspects, but also in more time spent

[143] Interview1, P32:163-164.

[144] Interview2, P45:279-287.

[145] Interview3, P60:311-328

on discussing relevance of information sources. This was partly caused by a difference in relevance criteria[146]. Group member C4 did not search very much, but read the information found by others. He explained that he had a lack of search task knowledge and skills, which may explain why no searching activity was marked for C4 at midpoint and at the end.

Due to the results above, information seeking activities tended to be affected by social factors (e.g. communication, discussion and sharing of information), work task factors (e.g. the shift between the general work task element and specific subtask elements derived from the delegated assignment parts) and personal factors (e.g. differences in relevance criteria).

9.3.1.1 Use of information sources

Derived from the information seeking activities above, various information sources were used according to the subtask and point in process. Hence ‘use’ could refer to the prefocus stage, implying exploration of topic; to the focus-formulation stage, implying building up an information ground to write a specific part of the assignment; or to the postfocus stage, implying checking of information sources in order to finish the work task product. In Table 9.17-9.19, the use of personal, physical and electronic information sources during time is shown. The data originate from number B2.1 in the process surveys, due to which each group member should mark a source and its importance ‘at the moment’ with a number from 1 (low)-3 (high). Only sources assigned values 2 or 3 are shown.

[146] Interview2, P47:407-423

B2.1 *Mark those information sources (type) that you use at the moment and their perceived importance to the project. (1=low; 3=high).* Only x's with value 2 and 3 are shown

	journals on the Internet	other material on the Internet	printed journals	books	newspapers	teachers	supervisor	group members	teaching
22-10-2004									
A1		X	X	X	X			X	X
A2		X		X				X	
A3				X	X			X	
19-11-2004									
A1		X	X	X	X	X	X	X	
A2									
A3		X		X	X				
17-12-2004									
A1				X		X	X	X	
A2		X		X					
A3	X	X		X	X		X	X	

TABLE 9.17. Use of information sources – group A.

The number above the group member column refers to the number in the process survey, e.g. B.2.1 refers to *Information seeking, Choise and use of information sources, Type.* The grey parts show the sources that were used by all group members 'at the moment' during the process

B2.1 *Mark those information sources (type) that you use at the moment and their perceived importance to the project (1=low; 3=high).*

Only x's with value 2 and 3 are shown

	journals on the Internet	other material on the Internet	printed journals	books	newspapers	teachers	supervisor	group members	teaching
22-10-2004									
B1	X		X	X					
B2	X		X	X				X	
B3	X		X	X					
19-11-2004									
B1			X	X					
B2				X			X		X
B3				X					
17-12-2004									
B1			X	X					
B2	X		X	X		X		X	
B3			X	X					

TABLE 9.18. Use of information sources – group B.

The number above the group member column refers to the number in the process survey, e.g. B.2.1 refers to *Information seeking, Choise and use of information sources, Type.* The grey parts show the sources that were used by all group members 'at the moment' during the process.

B2.1 *Mark those information sources (type) that you use at the moment and their perceived importance to the project (1=low; 3=high).*

Only x's with value 2 and 3 are shown.

	journals on the Internet	other material on the Internet	printed journals	books	newspapers	teachers	supervisor	group members	teaching
22-10-2004									
C1				X	X		X	X	
C2		X		X					
C3				X	X		X	X	
C4				X	X		X	X	
19-11-2004									
C1				X			X	X	
C2				X	X			X	
C3				X	X		X	X	
C4		X							
17-12-2004									
C1		X	X	X	X		X	X	
C2		X		X	X		X	X	
C3				X	X				
C4				X			X	X	

TABLE 9.19. Use of information sources – group C.

The number above the group member column refers to the number in the process survey, e.g. B.2.1 refers to *Information seeking, Choise and use of information sources, Type.* The grey parts show the sources that were used by all group members 'at the moment' during the process.

Looking *across groups*, more identical information sources are generally shared among group members at start and end than at midpoint, where a more differentiated picture can be seen. Again, this was related to the start of writing according to which group members concentrated on different parts of the assignment. Despite a difference in use between groups, the 'book' was, however, preferred to all and independently of point in process. This was to some extent related to the nature of the assignment topics deriving from two courses on cultural studies.

Looking at the *intragroup level*, the use of information sources in *group A* seemed to be associated with the division of assignment parts. Besides the use of 'books' and 'personal sources' at start and end, A1 who was in charge of the most complex part generally employed more *different* information sources than the rest of the group. In comparison, A2 who was in charge of a rather descriptive part of the assignment, only used few information sources during time. This was also the case with A3, being in charge of a very concrete part, except for the last period where her engagement in writing on various parts required more sources to be used. According to B2.2 in Appendix 29, these information sources were found from a number of different information systems, but in particular from the use of 'other libraries' (than the library at the Royal School of Library and Information Science (RSLIS)), 'OPACs' and the 'Internet'.

In *group B*, only few sources were employed, such as 'journals' (printed and electronic) and 'books', and they were generally identical across the group. This was related to the division of the assignment into three parts with a subpart from each being delegated to each group member. Hence, all group members were engaged in a descriptive as well as an analytical writing task, requiring the same type of sources to be used. According to B.2.2 in Appendix 31, the information sources were generally found by the use of the 'RSLIS library' (physical and online),'other libraries' (physical and online) and the 'Internet'.

In *group C*, 'books', 'newspapers' and 'personal sources' (supervisor and group members) were generally used at all stages of the process, independently of the many shifts in focus. Group member C2, however, only found personal sources important at the end. According to B.2.2 in Appendix 33, the information sources were generally found by using 'other libraries' (online), 'other databases' (than OPACs) and the

‘Internet’. According to C3, the use of information sources should also be seen in association with their educational background. As she pointed out, for example, the Internet would have been used much more by the group if they had not been LIS students, due to which databases, OPACs etc. were acknowledged as qualitative information sources, whereas the Internet was not.

As can be seen from above, choice of information source (type and channel) seemed to be affected by *work task factors*, such as the nature of the subject and the specific part of the assignment (descriptive or analytical), personal characteristics may, however, affect as well. This is further addressed in the section 9.3.4. on personality in information seeking.

9.3.2 Cognitive aspects

This section addresses the cognitive aspects associated with information seeking activities, involving group members’ relevance assessments during time and their perception of ‘enough information’. For example, when did group members generally perceive they had enough information to write the assignment and how was this decided.

9.3.2.1 Perceived relevance during time

Figure 9.20-9.21 show the perceived relevance for each group during time based on group members’ agreement to the easiness of judging relevance ‘at the moment’. This was indicated by a number from 1 (= disagreeing) to 5 (= strongly agreeing) in each of the three process surveys. The implicit inference was that the easier it was to judge relevance, the more *cognitively* involved in the subject the group member was.

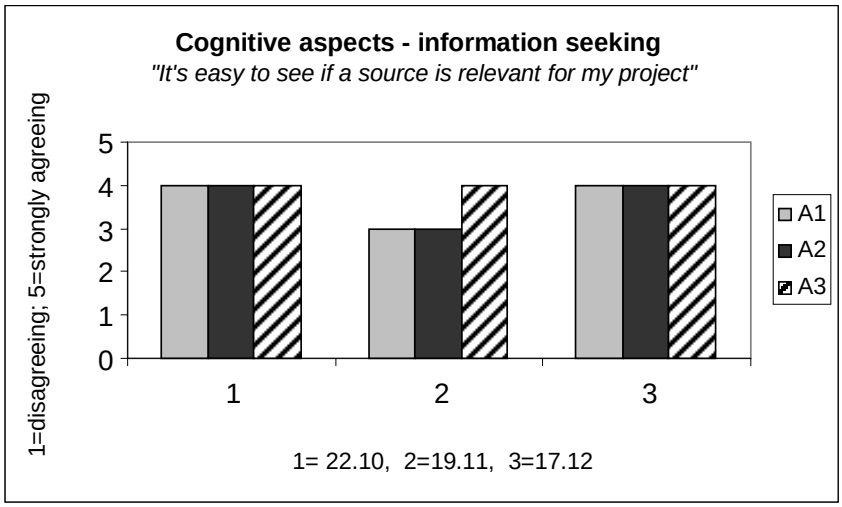

FIG. 9.20. The 'easiness' of relevance judgement during time - group A.

Based on question B.3.1 in the process survey.

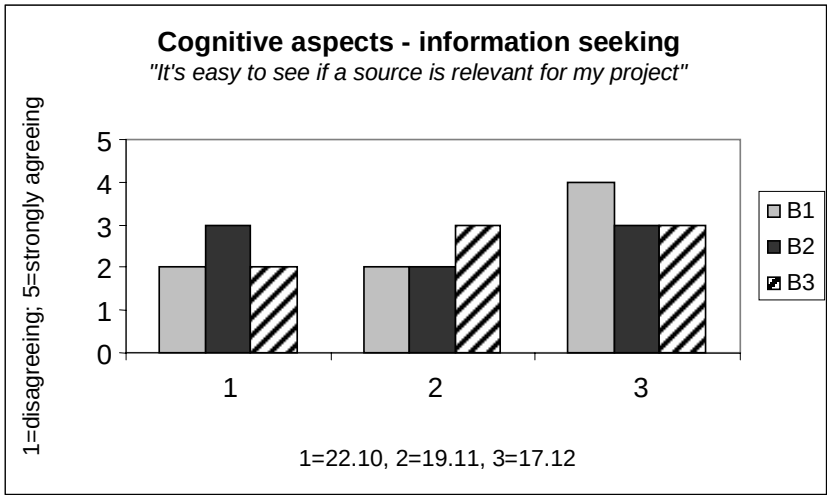

FIG. 9.21. The 'easiness' of relevance judgement during time - group B.

Based on question B.3.1 in the process survey.

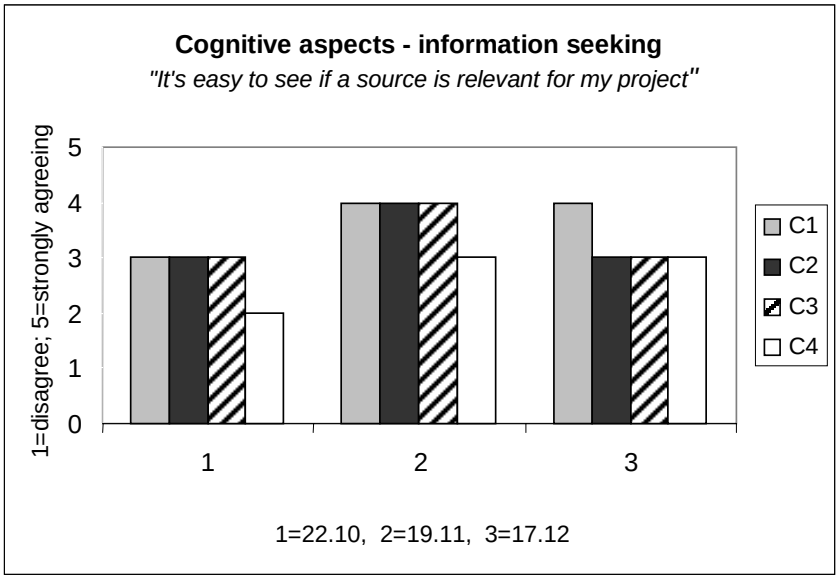

FIG. 9.22. The 'easiness' of relevance judgement during time - group C.
Based on question B.3.1 in the process survey.

Though no high values of relevance judgement were perceived across all groups, a slight *increase* from 30 points at start to 35 point at the end was identified, if we add op all values for all groups and for each period as shown in Table 9.20.

Relevance		
1 (22.10)	**2** (19.11)	**3** (17.12)
30 point	32 point	35 point

TABLE. 9.20. Easiness of 'relevance judgement' during time.
Values (1-5) for all groups have been added up (max=50).

If, however, we look at the average values for each group as shown in Table 9.21 (max=5), *group A* generally found it easier to judge the relevance of information sources than the rest of the groups. This also seemed to be associated with the

characteristics of the subtask. As stated by A2, for example, "my subject is simple, so it's not difficult to judge relevance"[147] .

Relevance			
Group	**1** (22.10)	**2** (19.11)	**3** (17.12)
A	4	3	4
B	2	2	3
C	3	4	3

TABLE 9.21. Easiness of 'relevance judgement' during time.

Average values on a scale from 0-5 (max=5) for each process survey (1-3) and for each group.

Group B, in particular, had difficulties in judging relevance at the prefocus and focus formulation stage, for example explained by B2: "..it's difficult to judge relevance – we are thinking differently…"[148] and, as B3 explained, "… we haven't decided how to delimit the subject yet"[149]. In addition the difficulties in judging relevance at start, B2 mentioned in the first diary that she had difficulties in reading some of the material, which just made her feel more frustrated[150].

Finally, g*roup C* experienced a medium easiness in assessing relevance, independently of their frequent shifts in focus. According to C3, for example, she generally thought it was difficult to find relevant books[151]. This may also explain why she explicitly stated in the third diary that the finding of relevant material had affected her mood positively.

In addition to the experience of 'easiness', each group member was asked to mark in the process survey what relevance criteria he/she employed 'at the moment' when assessing documents for use and note the importance in each case with a number from 1 (low) to 3 (high). The criteria were: 'scientific high value', 'author's cognitive authority',

[147] Interview2, P42:237-253.

[148] Interview1, P40:344-357.

[149] Interview1, B3, P39:215-231.

[150] Diary1, P5:69.

[151] Interview3, P57:241-261.

‘acknowledged information source’, ‘language is clear and fluent’, ‘document is giving an overview’, ‘document is considered thoroughly worked out’, ‘actuality’, and the ‘layout of the document’. The relevance criteria marked by each group and group member can be seen under number B2.3 in Appendix 29; 31 and 33.
If looking *across groups*, the criteria ‘thoroughness of the document’ was chosen by all group members at all stages, except for B3 at midpoint and end.

In *group A*, the group members had many criteria in common, particular at the beginning, and before the devision of the assignment. The ‘cognitive authority of the author’ was, however, important to all group members throughout the process.

When looking at *group B*, many different criteria were employed across group members and stages. Further, it was found that B1 and B3 used very different criteria, though they were in charge of the same type of assignment part, whereas the criteria used by B2 either differed from B1, from B3 or both. This difference in criteria may explain the perceived difficulties in collaborative relevance assessment, as stated by B2 above, but may also relate to the different personality characteristics demonstrated in the first result section.

Besides ‘thoroughness’ and ‘cognitive authority’, the applied criteria in *group C* were spread across the group. This may be associated with the many shifts in focus during the process, hence affecting the need for and relevance of information sources accordingly. According to C3, relevance criteria depend very much on the specific work task subject[152]. C4 generally employed fewest criteria at all stages compared to the others, which may be associated with his low searching activity, as presented earlier.

9.3.2.2 The concept of ‘enough information’

To get an impression of factors affecting ‘search closure’, each group member was asked at the third interview if they found that they had had enough information for writing the assignment and how this was decided.

[152] Interview2, P47:407-423.

In *group A* and according to *A1*, the group stopped searching because they decided to spend energy on *writing* and on the 'product', instead[153]. Later when she reached a focus in her part of the assignment, she looked at the information already retrieved, hence did not initiate a new search. In addition to this, she mentioned *time* as an important factor, e.g. "I would have searched more information if I had had more time"[154]. According to *A3*, the *size* of the assignment was important, as it implied a limitation of the information needed[155].

In *group B*, the assignment was early on divided into three parts concerning three specific subjects which meant that the search, according to *B1*, already at start was limited in focus[156] . However, she found it very difficult to know when to stop; she kept thinking that more relevant information would be available and wanted to try it out, hence only *time* made her stop searching. She often had this feeling in group work that they stopped searching too early.
To estimate search closure, *B2* referred to the *formal requirements* regarding the number of pages that should go into the reference list in the assignment (600 pages). In addition to this, she mentioned that the occurrence of the *same authors* in the literature also was an indicator of having found what was adequate for the specific subject in focus. However, *psychological factors* also seemed to affect, since she consciously avoided searching at midpoint (the information overload-problem): "…it [information] just make me more confused…"[157].
Group member *B3*, in turn, stopped when she got *tired of reading* and the retrieved information seemed to be adequate[158].

In *group C*, various criteria were applied. Group member *C1* found it difficult to decide when enough information had been gathered: "I have a tendency to keep on collecting information…I'm afraid of overlooking important information"[159].

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[153] Interview3, P58:276-280.

[154] Interview3, P58:284-296.

[155] Interview3, P53:199-220.

[156] Interview3, P55:268-284.

[157] Interview3, P60:267-295.

[158] Interview3, P59:275-287.

Group member *C2*, in turn, stopped when she thought she had been *doing her best* and got what *she* needed[160].

According to *C3*, she stopped searching when the *writing process* started. "…I get frustrated and stressed if more information is collected…"[161]. However, new information had to be collected towards the end due to a new shift in focus.

Group member C4, in line with C1, also mentioned the difficulties by knowing when to stop, e.g. to know whether they had got all the relevant information. In connection with this, he stressed the advantage of being *more* people to search for information[162]. As mentioned earlier, he generally preferred to search on a collaborative basis. He had also been searching by himself, but not without involving the other group members in what and where to search.

As can be seen from the results above, not only criteria related to the *content* of the assignment were employed to determine search closure; also *work task factors* such as time and formal requirements, and *psychological factors* tended to affect group members' ending of the information seeking process. The psychological factors and affective aspects of information seeking are further presented in the next section.

9.3.3 Affective aspects

Table 9.22 below shows the group members' affective experiences during time, that is, in the first, second and third process survey. Each group member was asked to assign a value to each of four affective dichotomies on a scale from 1 (positive) to 5 (negative), that is: Easy (1) - Difficult (5); Relaxing (1)- Stressing (5); Simple (1) – Complex (5); Satisfying (1) – Frustrating (5). A value assigned to 'Other' was also allowed.

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[159] Interview3, P57:241-261.

[160] Interview2, P46:279-303.

[161] Interview2, P47:331-351.

[162] Interview2, P44:368-380.

FEELINGS	**1.** (22.10)				**2 .** (19.11)				**3.** (17.12)			
	Difficult	*Stress*	*Complex*	*Frustra-ting*	*Difficult*	*Stress*	*Complex*	*Frustra-ting*	*Difficult*	*Stress*	*Complex*	*Frustra-ting*
A1	3	3	4	2	2	2	3	2	4	3	4	3
A2	2	3	4	3	4	4	2	2	3	2	3	3
A3	1	1	1	3	4	3	4	3	1	1	1	1
Average	2	2	3	3	3	3	3	2	3	2	3	2
B1	3	4	4	3	2	2	3	4	3	3	3	3
B2	4	3	4	4	3	4	3	3	2	2	2	2
B3	1	2	3	1	2	1	3	3	3	3	3	3
Average	3	3	4	3	2	2	3	3	3	3	3	3
C1	2	2	3	2	2	3	3	3	2	3	3	3
C2	2	1	2	1	0	0	0	0	4	3	4	3
C3	3	3	5	4	3	2	3	4	2	3	1	1
C4	3	3	4	3	3	3	3	3	3	3	3	2
Average	3	2	4	3	3	3	3	3	3	3	3	2

TABLE 9.22. Group members' affective experiences in association with 'information seeking'. The table is based on group member values assigned to affective dichotomies on a scale from 1 (positive) to 5 (negative) under number B.4.1 in each of the process surveys (1-3). C2 was not seeking information at midpoint, hence the '0'-values.

According to Table 9.22, information seeking was perceived as *complex by many group members*, in particular at the beginning. If looking at the first (at start) average values of complexity across groups, group A perceived *some* complexity (value=3), whereas group B and group C perceived *high* values of complexity (value=4). This decreased, however, to 'some complexity' at midpoint and end, in line with group A. In addition to the medium to high average values of 'complexity', medium average values were in general found in association with 'difficulty', 'stress' and 'frustration, hence also indicating that seeking information only *rarely* was considered 'easy', 'relaxing', 'simple' and 'satisfying' by *groups*.

These experiences have further been explored in the interviews, in particular with regard to group members' perception of *complexity*.

If looking at the *intragroup level*, *group A* demonstrated different affective experiences during the process. Group member *A1* and *A2* generally found it difficult to perform subject searches at start, since the subject or phenomenon in focus was quite new, implying that no subject terms covering the phenomenon were available. In addition, they only knew very little about the subject at this point, meaning that they were lacking

relevant aspects to search for. After the delegation of assignment parts, however, the perception of complexity by A2 changed towards 'simple' as her part of the assignment turned out to be simple due to its descriptive character[163], whereas A1 found it difficult and complex due to *her* more complex part of the assignment. The high value on 'difficulty' at the end was associated with one specific search system. Group member *A3*, in turn, had a very concrete search task at the beginning, and was only skimming course literature, hence the low emotional values in the first period. At midpoint this was replaced by higher values of 'difficulty' and 'complexity' as she had problems in finding relevant search terms expressing the topic[164] and in knowing what sources would be relevant to search[165]. However, the 'central book' found by A1 later helped her generate relevant search terms. In general, A3 preferred to find a few very relevant documents to start from; this often initiated the generation of ideas with regard to the assignment.

In *group B*, group member *B1*, generally found it difficult to perform a proper search, e.g. "…you stop searching because you get tired and think you have got enough information, but suddenly you may find a source that is very relevant and you are wondering why you did not find that earlier…frustrating that you don't know whether you have found enough *relevant* information.
According to *B2*, it was difficult and complex to search at start when the focus had not been found, but also in general. Searching was often associated with uncertainty, e.g. "…you know that there is something out there, but is it the relevant stuff that I have got?…how do you change the search then?…I don't think it is easy…what if you find the wrong information, this will be reflected in the product too"[166]. B2 generally preferred to search by using broad search terms or search without any prefix-codes, since it was easy to make a wrong search, as she said. In addition, she liked to browse in the library, because "…information could be found that you wouldn't have found by using the computer, simply because you did not know which search term to use" [167].. In

[163] Interview2, P42:237-253.

[164] Interview2, P43:395-411.

[165] Interview1, P33:295-296.

[166] Interview1, P40:392-396.

[167] Interview2, P50:320-328.

connection to this, she referred to a relevant book the group had found just by browsing in the library. Besides the generally low to medium values, the complexity perceived by *B3* was related to the complexity of finding proper search terms to express the subject and to judge which books that might be relevant. In line with B2, group member B3 found it useful to browse in the library, hence finding books that did not turn up when they searched in the OPAC[168].

When looking at the *individual group member level*, B3 was in general demonstrating medium to low values (=positive feelings) during the whole process, whereas B2 was demonstrating high values (=negative feelings), particular at the beginning and midpoint. This may again be related to their personal characteristics as previously described, due to which B2 had a tendency to perceive stress and uncertainty (in certain situations), whereas B3 had a calm and very optimistic attitude towards life in general. However, the collaborative aspect of information seeking also seemed to affect the individual's search behavior, e.g. as shown in the comment by B3 "…When I search on my own, I generally collect more information to be certain…whereas I am more critical when I search on a collaboratively basis"[169].

In *group C*, different affective experiences were identified. At the beginning, *C1* and *C2* generally found it simple to search, because they were experienced searchers in the systems employed (possessed profound search task knowledge and skills). However, with regard to the content of the search, C1 found it difficult to get an overview of the subject, and found subject searches to be diffused and confusing: "…it's much easier to make a verification"[170]. Group member C2 also found it difficult to know which search terms to use. She was actually rather satisfied with her search performance, until she found out that C1 had found a relevant source in the same system as she had been searching, which she apparently had missed: "I felt so stupid, hence it was all wrong what I had been doing…I had used the 'wrong' search terms" [171]. Thus, by comparing her search behavior with C1, her *perception* of her search performance suddenly

[168] Interview2, P49:453-473.

[169] Interview1, P39:255-263.

[170] Interview2, C1, P41:308-324.

[171] Interview1, P36:252-268.

changed[172]. This also demonstrates the 'competing' factors inherent in group work, e.g. that some group members cannot help compare their performance with others and react according to this. The 'competition' aspect may also have affected the interpersonal relations between C1 and C2, taking the personal characteristics into account as well. According to these, C2, for example, is an ambitious, competent and responsible person, who makes *heavy* demands on herself.
The complexity perceived at start by C3 was generally related to the less user-friendly search interface of 'her' information system[173]. At midpoint, the value related to 'relaxing' referred to the feeling of having found some relevant material, whereas the value associated with 'frustration' was related to the opposite, hence when no relevant information could be find. In addition to this, 'frustration' was also evoked if she for a while had kept on making the same mistake in the system[174].
With regard to C4, the high value on 'complexity' at start, and the medium values during the rest of the assignment period was associated with uncertainty derived from a perceived low search experience and with the selection of proper search terms.

According to the affective aspects demonstrated above, information seeking seemed to be affected by group members' perceived work task knowledge (e.g. reflected in the selection of proper key words according to the point in the process) and search task knowledge and skills (e.g. experience with search language and search interface). In addition, personal characteristics also seemed to affect the group members' affective responses to their information seeking behavior.

The personality aspects of information seeking are further addressed in the next section.

9.3.4 Personality and information seeking

The group members' personality has previously been referred to in connection with group work and work task behavior. However, and as already indicated by the results

[172] This emotional change occurred *after* the first process survey was handed in, hence is not reflected in Table 9.22.

[173] Interview1, P37:231-235.

[174] Interview2, P47:355-376.

above, personality may also help explain group members' *information seeking behavior*.

In the following, the personality aspect has been addressed with reference to the group member characteristics in Table 9.1, the information seeking behavior reflected by the participant profiles (Appendix 15) and the information seeking behavior just presented.

To compare the group members' information behavior with the personality dependent behavior identified by Heinström (2002; 2003a), Table 9.23 shows each personality dimension and its accompanying information behavior characteristics (based on Heinström, 2002). The personality characteristics associated with low and high values as previously shown in Table 5.1 have been replaced by group member IDs in accordance with group members' 'low' ('low' and 'very low'), 'middle' or 'high' ('high' and 'very high') levels of scoring. In this way, the table gives an overview of the group members' personal characteristics and how these may be reflected in their information behavior, as identified by Heinström. This will be further nuanced with reference to the results of the present study.

Personality dimension NEO-PI-R	Low level	Middle	High level	In relation to information behaviour Heinström (2002; 2003a)
Neuroticism	B3	A1, C2, C4	A2, A3, B1, B2, C1, C3	H: Feeling insecure. Preference for confirming information, resistance towards new information, difficult to judge relevance. Little effort and persistence in information seeking, lack of time a barrier, gave up easy. L: Constructive and positive attitude towards information, appriciated a large recall and were more prepared to possible changes. The more secure, the more actively they sought information.
Extraversion		A1, A2, A3, B1, C1, C2	B2, B3, C3, C4	H: Informal IR, preference for thought-provoking documents, wanted to find much information, preferred quick solutions and use of social abilities – consulted often teachers, supervisors (literature suggestions). Social interaction was an important part of their information behaviour. Information use tended to be more superficial. L: Was not identified in the study by Heinström
Openness to experience		A1	A2, A3, B1, B2, B3, C1, C2, C3, C4	H: Broad information seeking, incidental information acquisition and critical information judgement. Preferred thought-provoking documents, driven by intellectual curiosity. L: Conservative in relation to relevance judgement, preferred confirming documents.
Agreeable-ness	A1, A2, A3, B2, C3	C1, C4	B1, B3, C2	H: Was not identified in the study by Heinström L: Lack of time, impatient, did not prioritize information seeking, competitive, critical information judgement. Competitiveness useful in academic settings; implies sceptical and critical thinking.
Conscien-tiousness	B1, C4	A1, A2, A3, B2, C1, C2, C3	B3	H: Preference for thought-provoking documents. Willing to use effort – time, money and hard work – to obtain relevant information. Determined to achieve, also academically. Structure and persistence related to mastered information seeking. Goal-oriented, knew their aim and were responsible students. L: Carelessness was related to problems with relevance judgement; lack of time was a barrier to information seeking, preferred confirming documents. Got easily distracted, were impulsive, hasty, and choice of information was guided by a need for quick answers.

TABLE 9.23. Group members' personality scorings and their accompanying information behavior.

(based on Heinström, 2002; 2003a)

(H=High; L=Low)

If looking across group members in the table, they were characterized by ’middle’ to ‘high’ values of *neuroticism*, except for B3. With regard to the ‘high’ level, which was associated with insecurity (A2, A3, B1, B2, C1, C3), this should imply a preference for confirming information, and a resistance towards new information. Lack of time would be a barrier to information seeking and little effort and persistence in information seeking was expected. In addition, relevance could be hard to assess. In turn, a constructive and positive attitude towards information could be expected from the secure persons (B3) in addition to an appreciation for a large recall.

Due to the previous result presentation on information seeking behavior, the criteria used by several of the ‘insecure’ group members to determine search closure could be seen as indications of *neuroticism*. For example, B2 and C3 stopped searching to avoid getting stressed, confused or frustrated. Group member A3 and B1 stopped searching due to lack of time, though it did not imply that all relevant information had been found, which B1 found frustrating. C1 did not actually stop searching, as she was afraid of overlooking relevant information. B3, in turn, stopped when she found that enough relevant information had been found and when she got tired of reading, hence demonstrating a more confident behavior. With regard to relevance, B2 found it difficult to judge relevance, but this was partly associated with difficulties derived from collaborative relevance assessment. Though demonstrating a secure behavior, B3 found it difficult to judge relevance. Group member C3 generally found it difficult to find relevant books. The preference for confirming information was not identified, only indicated by *some* of the ‘insecure’ group members in the demographic survey, which is presented later. In contrast, the need for thought provoking documents was however indicated by B3. Though demonstrating ‘middle’ values of neuroticism, a *‘history of failure’* seemed to had affected the behavior by C4. He did not search very much, but read the information found by others:”…The information I found was not that relevant”. He explained that he had difficulties in knowing where to search and how to search in for example the Dialog databases. At start, he typically chose a broad term and explored the topic from there. Four group members were characterized by ‘high’ values on *extravert* (B2, B3, C3, C4), implying an active, but informal information seeking behavior based on quick solutions and use of social abilities. A preference for thought-provoking documents was expected. This behavior was not identified in the study. In the demographic survey, only C3 showed a tendency towards a preference for thought provoking documents among the four extravert group members. Though only scoring ‘middle’ values, C2 tended to demonstrate an extravert information behavior. She

preferred to search in collaboration with others, which she explained by a lack of patience. Further, she generally considered herself to be so good at searching that no preparation was necessary, meaning that she did not make any search plan on where and how to search in advance. She almost 'jumped' into the search process. If she had done the best she could, she thought the search had been satisfying.

Except for A1, all group members were characterized by 'high' values on *openness to experience*, which corresponds to the behavior of *innovators*.
Due to a curiosity and open attitude towards life in general, an inherent environmental scanning was expected that would result in an increase in information as well. Hence, a broad range of information was expected, rather than few precise ones as well as a critical approach to relevance assessment. Group member A2, B1, B2, B3, C1 and C2 were generally collecting an amount of information from the outset. At the beginning of an assignment project, A2 generally experienced many possibilities. She got very excited and started to collect a heap of information, which she skimmed and sorted for relevance afterwards[175]. C1, in particular, mentioned that it was a part of her strategy to seek broadly and spread out the subject. C3 generally found searching very exciting, despite the complexities of relevance judgement, and had the experience that she kept on progressing during the assignment process. She had a job involving a lot of searching, hence considered herself to have profound search task knowledge and profound search task skills, particular with regard to Dialog databases. She knew which strategies and search codes to use; otherwise she would just choose the 'simple search' facility. In relation to information seeking, this can also be seen as an example of a *secure* behavior associated with neuroticism.
In contrast, group member C2, stressed the importance of keeping a focus. This was in line with C4, who preferred to settle on a focus quite early in the process in order to limit the search. Group member A3 also preferred to find few very relevant information sources to start from, since it often initiated the process of idea generation[176]. Hence, the information encountering behavior that characterized group members being 'open to experience' was not identified among all group members. In contrast, this behavior was identified by A1, though demonstrating 'middle' values of *openness*. According to the

[175] Interview2, P42:.225-226; 233-234.

[176] Interview2, P43:395-411.

first interview, A1 possessed an inner curiosity and a desire for getting new knowledge. She never found searching difficult, rather challenging. She looked forward to the delegation of subtasks (specific parts of the assignment); hence she could focus her search for information, without loosing sight of the others' parts [177].
The employment of social sources (group members and supervisor) was particular demonstrated by group C and B2. A1 also used social sources a lot, though only scoring 'middle' values of *openness to experience*.

Half of the group members scored 'low' values on *agreeableness* (A1, A2, A3, B2, C3), meaning critical and skeptical persons, characterized by impatience. Hence, lack of time and time pressure was expected to be a barrier to information seeking, implying that group members would not devote enough time to information seeking. In contrast, B1, B3 and C2 scored high values on agreeableness, implying a friendly, positive and less critical approach to information and relevance judgment. With regard to the 'critical' group B-members, B2 demonstrated a skeptical and impatient behavior, particular with regard to group work, but this was also reflected in her approach to information seeking. A quick reduction of information was preferred, hence all group members were advised to read and judge relevance of *different* information sources. She generally searched without search prefixes, partly because she found it difficult to perform subject searches. In turn, the friendly, less critical attitude by B3 was demonstrated in the demographic survey and in the interviews, in which she stated that she generally collected much information to be sure. However, being part of a group had resulted in a more *critical* attitude, as she said.

The majority of the group members scored 'middle' values of *conscientiousness*, except for B3 (high values), and B1 and C4 (low values). Hence, it was expected to see a tendency in group members' behavior *towards* the use of effort (e.g. time and hard work) to obtain relevant information. In this connection, a preference for thought provoking documents was expected, as well as indications of a goal oriented and responsible behavior. Group members characterized by being more careless were expected to get easily distracted and to be impulsive and hasty. Perceptions of lack of time and a preference for confirming documents were also expected.

[177] Interview1, P38:188-194.

According to the demographic survey, indications of a conscientious behavior were identified for the majority of the conscientious group members. In addition, group member B2 demonstrated an efficient group work behavior that also implied an *efficient* employment of information seeking strategies, as mentioned earlier. Group member C2 had devoted so much time to the assignment project that she got very frustrated when the other group members did not match this. According to her, it is important to do all what is possible to create a good product.
The low values of *conscientiousness* were for example demonstrated by B1, e.g. when she did not read the book the group had agreed on reading before their next meeting. At a later point, she read another researcher's interpretation of the book, instead of the book itself.

Besides the information behaviour reflected in the interviews, Table 9.24 reflects indications of information behavior according to personality traits. As described in chapter 8 of the research design, thirteen statements on information seeking behaviour were formulated (number 11-23 in the demographic survey), each addressing one or more personality dimensions, in line with Heinström (2002). As indicated previously in the introduction of the demographich survey, a clear relation between a specific statement and personality dimension may be difficult to make - sometimes the information behaviour is associated with a specific personality dimension, at other times it may be dependent on the specific context of use or both. Hence, only indications of behavior can be stated. However, to reduce the number of possible interpretations, only the results associated with specific personality dimensions have been reported (number 11-19 and 23), leaving out the context dependent results.

According to Table 9.24, the replies were given in a form similar to the Likert scale. With a value from '1' (disagreeing) to '5' (strongly agreeing), each participant was asked to state his or her agreement to each of the 13 statements in the questionnaire. The personality dimension associated with each statement is explained in the text below the table.

To indicate the differences and similarities between intragroup members' agreement statements, the white areas emphasize the *intragroup similarities*, whereas the grey areas emphasize the *intragroup differences*.

Statement	A1	A2	A3	B1	B2	B3	C1	C2	C3	C4
11. I often get impatient if I don't find what I'm looking for	2	2	3	2	3	1	3	3	3	2
12. I prefer documents confirming my thoughts and ideas	3	3	1	3	2	1	1	2	1	3
13. I prefer documents creating new thoughts and ideas	4	3	4	4	4	4	5	5	4	3
14. I sometimes run into documents that I have not searched for on conscious	3	5	4	4	4	5	5	4	4	2
15. I often find documents by talking with or asking other people	2	4	3	2	3	4	5	4	2	2
16. Few, well chosen documents are enough to write an assignment	2	3	3	2	4	3	3	2	1	3
17. Sometimes I do not have time for searching documents	2	2	2	4	1	1	1	2	1	1
18. I prefer documents that are easy to access	2	2	1	3	3	2	1	2	1	1
19. Articles, published in journals, are reliable	2	3	2	4	3	2	4	3	3	3
23. I gladly wait two weeks for an inter urban loan	3	4	4	5	4	5	4	4	5	3

TABLE 9.24. Group members' agreements to selective information seeking statements representing various personality dimension(s).

(1=disagreeing; 5=strongly agreeing). The white areas emphasize intragroup similarities and the grey areas emphasize intragroup differences. The numbers and statements are based on number 11-23 in the demographic survey (Appendix 9). The results concern the statements representing *specific* personality dimensions: 11:neuroticism; 12:openness to experience (low values); 13:openness to experience; 14:openness to experience & conscientiousness; 15:extraversion; 16:openness to experience (low values); 17:conscientiousness; 18-19 & 23:agreeableness. The results concerning the *context* dependent statements have been left out of the table, but can be seen in the participant profiles in Appendix 15.

If looking at the groups, most similarities in behavior tended to occur between group members in group A, whereas most differences could be seen in group B and group C. This corresponds, however, well to the personality pattern demonstrated by the personality-scoring scheme in Table 9.1 and in Table 9.23 above.

The first statement in the table concerned *neuroticism*, but the replies did not reflect the general high value of neuroticism perceived by group members, except for B3. Only tendencies *towards* neuroticism were identified in five cases (A3, B2, C1, C2, C3). With regard to B3, however, the reply corresponded well to B3's very low value on neuroticism. Statement 15 implied indications of *extraversion,* which in this case was demonstrated by the high agreement values of A2, B3, C1 and C2. According to the

personality-scoring scheme, high extravert characteristics were only demonstrated by B3, whereas the rest were scoring 'middle' values on extraversion. However, based on the interview data, C2 also demonstrated an extravert behavior, particular at the beginning of the assignment process. Statement 12, 13 and 16 addressed *openness to experience*, as reflected by low values in 12 and 16 and high values in 13. As can be seen, the high scores on openness across group members in the personality scheme were also to a large extent reflected by the agreement values in the table. In four cases, 'middle' values were given to statement 12 (A1, A2, B1, C4). In five cases, only 'middle' values were given to statement 16 (A2, A3, B3, C1), and in one case, even a 'high' value was assigned (B2). When looking at statement 16, it could also be associated with an insecure behavior, hence motivating the need for few documents as a way to avoid confusion. Except for two cases (A2, C4), high values were assigned to statement 13.

Statement 18-19 and 23 addressed *agreeableness* all reflected by high agreement values. According to the personality scoring scheme, only B1, B3 and C2 demonstrated high values on agreeableness, whereas group A, B2 and C3 demonstrated a critical behavior. This pattern of agreeableness was, however, not reflected in the table above. 'Low' values (except for B1, B2) were in general given to statement 18. 'Low' (A1, A3, B3) to 'middle' values (A2, B2, C2, C3, C4) were in general assigned to statement 19 (except for B1, C1), and 'high' values were assigned to statement 23, except for A1 and C4 ('middle' values). With regard to B3, however, the reply corresponded well to high value on agreeableness in the personality-scoring scheme. Finally, statement 17 addressed *conscientiousness* as indicated by low agreement values. According to the personality-scoring scheme, all group members demonstrated 'middle' values on conscientiousness, except for B1, C4 (low) and B3 (high). When looking at table 9.24, low values were in general assigned to statement 17, except for B1, indicating a conscientious behavior among group members though it did not quite match the pattern derived from the personality scheme. With regard to B1, the high value on statement 17 corresponded to the low value of conscientiousness in the personality scheme.

9.3.5 Summary of results on information seeking

This section has addressed the results associated with group members' *interactive* information seeking behavior, that is *activities* as well as *cognitive* and *affective* experiences derived from that.

It was found that *various* information seeking activities were performed *throughout* the process, though differing according to the point and stage in the process. At the *prefocus stage*, information seeking activities were associated with the 'initial subject formulation' process, the 'identification of information needs', 'search for background information' and 'skimming of information sources'. At the *focus formulation stage*, group members were engaged in 'subject exploration', and in some cases also 'goal oriented searching', implying a search for specific information. At the end, one group was still 'exploring the subject', but in general groups were engaged in 're-checking information sources for new information' as part of the *postfocus-stage.*
As stated in the previous result section on the 'work task', the work task stages as perceived by *group members* may not in all cases correspond to the *formal* time division of the assignment process, that is, start, midpoint and end.

Further, information seeking activities were found to differ according to shifts in work task levels, meaning between an individual and a group level of performance.

At the *beginning*, most information seeking activities were performed collaboratively (either in common or as a distributed activity) in order to find a *shared* focus of the assignment. At *midpoint*, the number and type of activities *differed* across the groups due to the characteristics of the delegated part of the assignment and the pause in group work caused by the other assignment. At the *end*, information seeking activities were generally *shared*, involving rechecking of information sources. Hence, information seeking activities shifted according to the shifts of the work task process. Examples of *collaborative* and *social information seeking behaviour* were also found at group meetings, e.g. demonstrated in the use of cognitive strategies and strategic sharing. For example, information deriving from individual work task and search task knowledge and skills was communicated, discussed, distributed and exchanged among group members, e.g. to formulate and obtain a shared focus of the assignment. The distribution of information seeking activities (strategic sharing) generally served an efficient purpose. However, in some cases it also implied that information read by only *one* group member constrained the generation of a *shared* understanding. This was for example demonstrated in group discussions, when it turned out that difficulties in reaching a consensus of focus was rooted in the quite *different* understandings derived from their *different* readings. Hence, *differentiated reading of information* at the

prefocus stage may be an obstacle to the construction of a *shared* focus and understanding.

When compared to *case study 1*, the aim of searching activities also differed according to point in process. For example, group members were generally 'seeking background information' at start, seeking relevant information at midpoint, and checking and verifying information sources at the end. Moreover, these information seeking activities were in general performed as a *distributed* activity; the social dimension of information behavior was, however, also demonstrated in case study 1.

In association with the different work task activities in case study 2, *various* and *different information sources were used* according to the point in process. 'Use' could refer to the prefocus stage, implying exploration of topic; to the focus-formulation stage, implying building up an information ground to write a specific part of the assignment; or to the postfocus stage, implying checking of information sources in order to finish the work task product.
Besides a preference for 'books' throughout the process that might be explained by the nature of the topics (cultural studies), a difference in information use was identified *between* group members. This was to a large extent related to the characteristics of the delegated parts, e.g. the difference in subtask complexity. With a focus on the social dimension of information behavior in the present study, the use of 'personal sources' differed across groups and group members during time, hence indicating that group members were not considered relevant as information source by all group members and at all stages, which again seemed to be related to the deviation of the work task into subtasks.

The employment of *various* information sources during the project assignment was also found in *case study 1*. In addition, the use and relevance of information sources *differed* according to the point in process, the characteristics of the specific subtask in charge (delegated part of the assignment) and the characteristics of intragroup members. Personality factors were, however, not taken into account in the first case study. In both case studies, 'printed' and 'personal' sources were preferred to other sources throughout the assignment process.
With regard to the *cognitive aspects* of information seeking in case study 2, a slight increase in the easiness of judging relevance was identified, which seemed to

correspond to the increase in perceived focus. Hence, the groups generally found it difficult to judge relevance at start when no focus had been formulated. However, the perceived complexity of judging relevance also turned out to be related to the character of the delegated part, meaning that *simple* subtasks entailed less complexity in judging relevance than *complex* subtasks. Besides subtask complexity, differences in relevance criteria employed by intragroup members were also found to explain the difference in relevance judgement.

To get an impression of the relation between search closure and knowledge construction, the criteria used by group members to determine when 'enough information' had been found were addressed. Due to the results, not only criteria related to the *subject* of the assignment were employed to determine search closure; also *work task factors*, such as time and formal requirements, and *psychological factors*, such as stress avoidance, tended to affect group members' ending of the information searching process.

With regard to the *affective aspects*, many of the group members perceived information searching as complex at the beginning. This was related to the prefocus stage when no focus had been found yet, hence difficult to perform a search and judge relevance. But also at midpoint and towards the end, 'some' complexity was found in addition to 'some' difficulty, stress and frustration, which, in turn, indicated that information seeking only *rarely* was considered 'easy', 'relaxing', 'simple' and 'satisfying' by *groups*.
The affective experiences associated with information seeking were also found to be related to the *perceived* level of search task knowledge and skills as well as personality characteristics. In addition, it was found that perception of search task performance could change negatively (and positively) when *compared* to the performance of *other* group members (e.g. in association with group based problem solving).

Compared to *case study 1*, the affective experiences identified in this study were primarily related to social and work task factors, hence did not demonstrate feelings such as uncertainty and clarity were not identified in association with information seeking behavior. This may be explained by the differences in research design between case study 1 and 2, due to which the emotional aspect of information seeking has been more thoroughly addressed in case study 2.

Finally, the group members' *personality* scorings in case study 2 were compared to the characteristics found in Heinström's study of personality in information seeking. Though co-relations between personality and information behavior identified in Heinström's study also was found in this study, many deviations could be seen as well. This may be explained by the difference in study approach, e.g. between the focus on individuals in Heinström's study and the focus on group members in the present study. As has been shown, the group based task performance process in focus here implied by nature *collaborative* activities, provoking *social behavior* that tended to affect the behavior of the individual group member. Further, individual behavior also turned out to be affected by the deviation of the work task into subtasks. Hence, it may indicate that *other* factors, besides personality, *differentiated* the individual group member's information behavior, in this case *social* and *work task* factors.

9.4 Methodological reflections

This section addresses the methodological insights and reflections derived from case study 2. Besides the experiences gained from the study, e.g. with regard to the employment of diaries, group members were also invited in the last interview to reflect upon their participation in the study. These reflections will go into the presentation as well. However, some limitations of the study should initially be mentioned.

9.4.1 Limitations of the study

Since the case study was based on 10 subjects and within one discipline (library and information science) and one context (academic setting), it may be difficult to generalize from this study to other forms of group work or teamwork, e.g. within another discipline or within an organisational setting. The participants' search knowledge and seeking behavior may, for example, have been influenced by the mere fact that they were studying library and information science discipline, meaning that they generally will be more acquainted with information seeking, more information literate than students from other disciplines. Moreover, the participants voluntarily chose to participate in the study, hence were *motivated* from the outset. Besides the many positive elements regarding motivated participants, e.g. in relation to diary keeping, it may further have affected the representativity of the groups.

Hence, we may say that the findings presented here only demonstrate *indications* of group based information behavior in academic settings.

Due to the research design, no direct observations of subjects were made. Hence, results and findings were based on *indirect* observations, that is, each group member's *perceptions and experiences*, either in written or oral form. Some researchers may argue that this study rely too much too subjective data, hence being difficult to state anything in general. However, from a *phenomenological* point of view, these personal perceptions and experiences have served to gain *insight* into human thoughts and behavior during personal, social and contextual interaction.

To describe and nuance the descriptions of group members' personal characteristics in case study 2, the long version of the NEO-PI-R personality test was employed (factors and facets) as opposed to the short version used in Heinström's (2002) study. These descriptions have been used in the discussion of similarities across groups and intragroups in relation to group work and work task performce. However, with regard to information seeking, only the general level of the personality test was employed in combination with many of the same statements used by Heinström. In this way the behavior of each group member was compared with the behavior of the individual's in Heinström's study, hereby being able to identify similarities and differences that may be associated with the group-situation. However, taking also the facet level of group members' personality traits into account may had given us an even more nuanced picture of personality and information behavior in group settings, but also the risk of ending up with too much data that would be even more difficult to relate to patterns of information behavior.

In line with the collective case study approach, two case studies have been conducted to strengthen the research design and the empirical findings. It is, however, evident from the presentation of the two case studies that case study 1 only had a *pre-liminary* function in relation to case study 2, meaning that the analysis primarily concentrated on the results from case study 2. When considering if case study 1 could have been left out of the thesis, it did, however, contribute to case study 2 in more ways. The study showed that group members due to group conflicts *may* react and behave differently from the ISP-model. Group members did not *seem* to assimilate, but were affected by their cultural background and personal characteristics, meaning that they behave

differently from each other in relation to work task performance and information seeking. This resulted in a new research question in case study 2. Further, the design and employment of the diary contributed to a new design and usage in case study two, which better seemed to ensure the quality of the collected data. In addition, the results from case study 1 have contributed to the result summaries of case study 2 and the discussion of the five research questions in the next section, in particular with regard to the group development process, the 'familiarity' aspect and work task performance.

Finally, many quotations have been used as documentation. Since they have been translated from Danish into English they may not always express the exact wording of the original statements. Slang, for example, may be difficult to translate.

9.4.2 Diary usage – experiences and reflections

The variation in form and usage of the diary method in case study 1 and 2 has resulted in various *methodological* experiences, which also have been reported in Hyldegård (2006).

Concerning the *design* of the two diaries, the structured form of diary 1 with closed and pre-coded response categories comply with the request for feasibility and ease of use but may, however, also discourage the free generation of open text usually associated with the diary genre. In case study 1, for example, the pre-coded categories turned out to affect the way participants *thought* of their activities, and thus, *described* their activities in the diary. These findings are similar to the participants' use of generic terms in the diary study by Czerwinski, Horvitz & Wilhite (2004, p. 2). In case study 2, on the contrary, the free and unstructured format of diary 2 allowed for *more* text and in the participants' *own* words. However, the labour intensive work required to post-code and make sense of data may be a constraint, e.g. to projects lacking time and resources or where the sample is large. Further, to control the amount and consistency of content, instructions in how to the use of the diary are still needed, both orally, in the diary and through pilot testing. In addition, the motivation of participants in recording activities is important. In line with the literature on diaries (e.g. Corti, 1993; Verbrugge, 1980), a slight decrease in recordings across groups and case studies were found. In case study 1, the decrease was found toward the end, primarily due to the end of the assignment, whereas the decrease in case study 2 was found towards the end of *each* diary period,

partly due to the weekend. This may indicate, however, that end of diary period – no matter how long – 'trigger' a decrease in diary recordings.

According to Rieman (1993), the *length* of the diary period plays an important role to the perceived burden of diaries. However, the one-week periods in case study 2 seemed to be too short. A part of this was associated with the convenience of the design and the printed format, hence making the diary easier to hold; another part seemed to be associated with a frustration derived from periods of almost no assignment activity to be recorded. This resulted, however, in various comments in the diary instead, actually informing about the participants' *context* of information behavior. Hence, 'empty' *activity* periods may as well result in useful information in the diary.

Another aspect of the diary usage relates to the type of *content* that was recorded. Since the participants had been encouraged to record observable activities associated with group work, the work task product and information seeking, mental activities, such as the participants' reflections and cognitive experiences, did only rarely enter into the diaries, particularly with respect to diary 1. Hence, diary data were primarily *activity* data. This stresses, however, the importance of the interview method to triangulate the exploration of information behavior, in line with Toms & Duff (2002). In this respect, the diary-method served as a guide for the interviews, in particular in case study 2, when deciding which issues to address and when referring to specific incidents during the interviews.

The *form* of the diaries also differed. The majority of participants in case study 1 found that a two-page diary was acceptable. However, the electronic diary turned out to be an obstacle to daily recording compared to filling out the printed diary in case study 2.

Some of the methodological problems associated with case study 1 might have been avoided if the diary had been pilot tested in context prior to the official start of the study. In this way, it was possible to correct the design and limit the risk of misconceptions as well as to train the participants in using the diary. Pilot testing seemed to affect the usage of diary 2, as no examples of inappropriate use were identified.

With regard to the study of group members' information behavior, both diaries generated data that enabled the researcher to see differences in behavior (activities and emotional experiences) across group members, which turned out to be associated with individual (personal), social and work task factors.

Outside the scope of study and in addition to the diary as research tool, both diaries turned out to serve as instruments for group members' reflection, learning and management. Thus, the diary method *itself*, may affect participants' cognitive experiences and reflections, in line with Rieman (1993) and Czerwinski, Horvitz & Wilhite (2004), but may as well stimulate the working process, hence, *motivating* group members to cooperate.

Based on experiences from the two case studies, the diary method may generate useful data on information behavior processes in group based settings over time, particularly on activities associated with information seeking, the work task or group work. The structured design, requiring the participants to assign recordings to pre-coded categories may, however, tended to counteract the quality inherent in the diary genre to elicit personal thoughts and experiences. The free form, in turn, generate more personal text data but still needs some structure and instruction to control the amount as well as the validity and reliability of data. To minimize the delay between event occurrence and registration, a diary should be practical and easy to use with a minimum of workload. The printed form was here preferred to the electronic one. As stated by other studies, the diary-interview method proved to be important - both when bringing thoughts and reflections into light and to triangulate research on information behavior.

More research is, however, needed into the usage of the diary method in studies of group based information behavior. E.g. how should collaborative information behavior in context at best be recorded, and how should the diary at best be employed as a *meta-cognitive* tool to contribute to the process of construction at the *group* level.

9.4.3 Additional participant experiences and reflections

Participants' experiences and reflections concerning the employment of specific methods in case study 2 and the study in general were collected in the final interview.

The participants were in general positive towards their participation in the study and the personal outcome of it, e.g. demonstrated in quotations such as: "…it has been funny, provided me with a new knowledge and insight…"[178]; "…interesting to learn about oneself.."[179]; "…made me reflect more upon the group process…"[180] and "…it has made me reflect more on my own role in the group…"[181]. This may also be seen as indications of the Sense-Making study approach.

In addition, participants were generally positive towards the personality test, the process surveys and the interviews. Though some of the participants were sceptical towards the outcome of the *personality test*, they found it interesting to discuss the result with a professional afterwards (Professor Niels Ole Pors). The *process survey* was experienced as easy to understand and fill out. However, some of the participants found it difficult to compare feelings with a number from 0-5. In addition, one participant found it difficult to assess importance of relevance criteria 'at the moment' without being able to assign the value to specific information sources.
Many of the participants had experienced the *interview session* as a room for reflection over the work task and group process. Some of the participants, however, had felt the situation a bit uneasy at the beginning, partly due to the artificial dialogue situation and the use of a tape recorder.
The practical feasibility of *the binder* was stressed by many of the participants. During the study, it (the binder) was returned to by participants for checking, e.g. when to fill out the process survey or participate in an interview. Further, its physical presence had reminded them of their participation in the study, e.g. that diaries, process survey etc. should be filled out.

[178] Interview3, P51:367-369.

[179] Interview3, P52:362-366.

[180] Interview3, P54.339-340.

[181] Interview3:p59:473-477.

10 Discussion of findings

This chapter discusses the findings of case study 2 according to the five research questions of the study. Findings presented in the summaries of chapter 9, hence also findings from case study 1, will be taken into account and discussed with reference to the theory presented in chapter 2-5 on information seeking, the work task, group work and personality.

The research questions concern two main research interests: 1) group member behavior and 2) factors affecting group member behavior. Research interest 1 consists of two research questions, whereas research interest 2 consists of three research questions. The chapter leads up to the presentation of the Group Member in Context (GMIC)-model.

10.1 Research question 1

To explore group members' information behaviour (the activities and cognitive and affective experiences), the first research question addressed the information behavior of the individual *group member* in order to compare it with the information behavior of the *individual* in the ISP-model:

Will group members behave differently from the individual modeled in the ISP-model? If so, in which way do they behave and why?

The answer given to this question will address the *similarities* and *differences* in behavior between Kuhlthau's study and the present study at a *general* level, while the *explanations* to these are further discussed in relation to research questions 3-5.

Kuhlthau's (1991; 2004) conceptual six-stage-model of the information seeking process (ISP) shows the information seeker's constructive (learning) tasks and activities of finding meaning from information to extend his/her state of knowledge on a particular problem.

The movement from one stage to another as seen in Figure 10.1 is caused by a series of choices regarding topic selection and focus formulation made through a complex interplay between three realms of activity: *physical* (the actions taken), *cognitive* (thoughts about the process and content) and *affective* (feelings experienced).

Tasks	**Initiation**	**Selection**	**Exploration**	**Formulation**	**Collection**	**Presentation**
Feelings (affective)	Uncertainty	Optimism	Confusion/ frustration/doubt	Clarity	Sense of direction/ confidence	Satisfaction or disappointment
Thoughts (cognitive)	vague ..... ▶			focused ..... ▶		
				increased interest		
Actions (physical)	seeking relevant information , exploring ..... ▶			seeking pertinent information, documenting		

FIG. 10.1. The [final] model of the Information Search Process.

(Kuhlthau, 2004, p. 82)

According to Kuhlthau (1991), the information seeking process is initiated by *uncertainty* resulting from a lack of understanding, a gap in meaning or a limited construction to solve a certain problem. This will change over time concurrently with the seeker gets information and construcs meaning to solve the problem. During the *initial* stages of the information seeking process the information seeker is commonly feeling confused, frustrated and in doubt; in the *final* stages he or she is commonly feeling satisfied, confident and relieved. 'Focus formulation' represents the *turning point* of the ISP where feelings of uncertainty diminish and confidence increases. The task here is to *form a focus* from the information encountered. At this point and throughout the rest of the process, information seeking typically starts to *decrease* whereas writing starts to *increase*, also signifying that the information seeker has started entering the 'presentation' stage. The presentation stage implies '*seeking closure'*, where the task is to complete the search and prepare to present or otherwise use the information collected.

In this context, two assumptions inherent in the ISP-model has formed the basis of the research questions:

1. The assumption that the information seeker and problem solver is an *individual* whose activities and cognitive and affective experiences almost solely are associated with *information seeking* at various stages of the ISP.

2. The assumption that a *natural* relation exists between end of seeking (search closure) on the one side, and problem solving and positive feelings, such as certainty and satisfaction, on the other.

As cognitive and affective experiences tend to be difficult to relate to *each* specific seeking/search stage in the ISP-model (Kuhlthau, 2004), this study has concentrated on the start, midpoint and end of the assignment process and employed the conceptualization introduced by Vakkari (2001) with relevance to academic work tasks: the *prefocus stage* (stage 1-3 in ISP), the *focus formulation stage* (stage 4 in the ISP) and the *postfocus stage* (stage 5-6 in the ISP). This is further discussed in relation to research question 3 of work task factors in group based information behavior.

Various *information seeking activities* were identified *throughout* the work task process, both in case study 1 and case study 2, which differed according to the point and stage in the process. In case study 2, information seeking activities at the *prefocus stage* were associated with the 'initial subject formulation' process, the 'identification of information needs', 'search for background information' and 'skimming of information sources' (relevant information). At the *focus formulation stage*, group members were engaged in 'subject exploration', and in some cases also 'goal oriented searching', implying a search for specific information (pertinent information). At the end, some group members were still 'exploring the subject', but in general groups were engaged in 're-checking information sources for new information' as part of the *postfocus-stage*. Similar goals for information seeking were identified in case study 1, which corresponded to the information seeking activities across the ISP. Further, the progress in relevance judgements from relevant to pertinent information was also identified as focus increased - in line with the ISP-model. Hence, at a *general* level no differences were seen between individuals' and group members' information search behavior while constructing knowledge. This finding has also been confirmed by studies of the ISP-model, both in academic and in professional settings (e.g. Byron & Young, 2000; Kracker, 2002; Kracker & Wang, 2002; Limberg, 1998; Vakkari, 2001). This may indicate that these goals of searching are *common* to knowledge construction in relation to complex work tasks, independent of context (professional, private or academic), individual or groups.

With regard to the work task process, the formal division into stages according to time (start, midpoint and end) did not fully comply with the work task process as experienced

by *group members*. For example, the formal 'midpoint', that is, the focus formulation stage, was by most of the group members perceived as the *'end of the prefocus stage'*, meaning that focus formulation occurred at a later time in the process – in line with Kuhlthau's (2004) studies leading to the refinement and adjustment of the original ISP-model. The changes regarded in particular stages 3-6, according to which focus formulation at these stages may consist of a *spiral* of thoughts rather than a neat step-by-step progression. The late focus formulation was further indicated by the focus formulation statements made in process surveys and interviews during the process.

Based on the focus formulation statements collected at start, midpoint and end, descriptions tended to fall in three categories across group members according to point in time: 1) motivations for topic selection, 2) structure of the assignment and 3) the specific 'problem' in focus. However, though no focus was not identified by group members at midpoint, focus *increased* during the work task process, in line with the *cognitive experiences* perceived by the individual in ISP-model.

One reason for the late occurrence of focus seemed to be the interference from 'another work task'. Though group members had discussed focus, and information seeking (and searching) activities had taken place prior to midpoint, more of the group members did not feel they really had started to work on the present assignment – not until the other assignment had been handed in (at midpoint). Another reason for the late focus formulation was that topics and subtasks of the assignment were distributed among group members, resulting in an *individual* behavior that further constrained the overall formulation of a *shared* focus. This is further described in relation to research question 3.

With regard to the focus formulation process of case study 1 it turned out that project closure (deadline) did not correspond to group members' *perception* of closure, indicating that they had not passed through *all* of the ISP-stages. This was to some extent associated with the group development process that existed parallel to the ISP and the work task process. This is further discussed in relation to research question 4.

If looking at the *activities* supporting focus formulation, and associating 'seeking' narrowly with searching and 'writing' narrowly with the work task product both case studies showed that information searching activities decreased as writing activities increased, in line with the ISP. However, when looking at information behavior from a broader perspective and in relation to a group based setting, various forms of information seeking activities that are *socially* rooted also contributed to the focus

formulation process. E.g. at group meetings, information was communicated, discussed, exchanged and shared, which helped formulate a *collective* goal and obtain a *shared* understanding of the problem in focus. From the middle to the end, though information was primarily communicated and discussed according to specific elements of the assignment, e.g. based on the reading of other group members' manuscripts. The social aspect of information behavior in group based settings is further discussed in connection with research question 4.

In addition to the *collaborative* information seeking activities, various forms of writing and reading activities were also found to contribute to focus formulation.
Writing at the *beginning* the of the work task process was associated with personal note taking in relation to the reading of information sources. At *midpoint* of the assignment process, group members started to write on the distributed topics, which resulted in differentiated work task knowledge across group members. At the *end*, writing was still performed on an individual basis, but towards the very end of group work, however, writing was done together (sitting in the same room) to integrate the various parts into a whole. Hence, writing was not solely associated with 'manuscripts', but all kind of writings that contributed as well as constrained knowledge construction and the generation of a collective product. This finding was also found in case study 1 and indicated by Kuhlthau (2004), as well as supported by Fister (1992), Mason (1998) and Rivard (1994).

Reading activities also differed according to work task stage. Reading at the *beginning* of the process concentrated on the skimming of information, reading of drafts from group members with regard to possible 'problem formulations' and on the reading of background information. From *midpoint and forward*, reading was associated with a more focused reading of theory. At the *end*, reading was associated with the reading of theory and personal notes while writing on the delegated part. Further, a critical reading of group members' writings was performed with the construction of a collective product in mind. Hence, various forms of reading as examples of information use may as well contribute to knowledge construction and collective product generation, though again being constrained by the shifts between collaborative and individual work task activities.
Based on these findings, information seeking activities occurred parallel to reading and writing, hence were not replaced by writing, as the ISP-model suggests. If looking at the

searching activity, implying active search by use of formal or informal information sources, this activity tended to decrease towards midpoint, as mentioned already. No clear and shared focus was, however, formulated by the groups at this point in the process. This turned out to be associated primarily with *work task* factors.
Since focus, though, increased during the process, this may, in turn, indicate that *other* activities besides searching had contributed to this.

With regard to the *affective* aspects of the ISP, many of the group members experienced information searching as complex at the beginning. This was related to the prefocus stage when no focus had been found yet, hence difficult to perform a search and judge relevance. But also at midpoint and towards the end, 'some' complexity was found in addition to 'some' difficulty, stress and frustration. Hence, a slight decrease in negative feelings was seen towards the end. This may be explained by the type of searching activity at the end (re-checking) rather than an implication of focus formulation. This is supported by that fact that most of the group members experienced negative feelings in association with searching *throughout* the process, also indicating that information searching only *rarely* was considered 'easy', 'relaxing', 'simple' and 'satisfying' by *groups.* This was found to be related to group members' perceived search task knowledge and skills as well as personality characteristics, in addition to the lack of focus at start. Regarding search task knowledge these findings correspond well to the findings made by Kuhlthau (1999) and Kuhlthau & Tama (2001) in relation to the ISP of a securities analyst and a lawyers. It was found that the information seeking behavior differed according to the information seeker's *perceived* work task knowledge and experience, e.g. shown in different approaches and reactions to uncertainty.
Affective experiences were also found in association with other activities, besides searching. Compared to the individual in the ISP-model, group members' emotional experiences according to work task stages generally *differed* from the experiences presented in the model. For example, a *high* level of confidence was identified at start and during the process, which turned out to derive from 'familiarity with other group members' and the associated feeling of safetyness and security. This was further reflected in a general *low* value of uncertainty across groups. The safetyness and confidence associated with group work and 'professional familiarity', in particular, may also derive from a perceived feeling of shared responsibility, which, in turn, may explain the generally high levels of uncertainty in the ISP. When working on an individual basis, the responsibility of the work task process and the outcome is, in

contrast to group work, *solely* placed on the individual. In addition to this, the positive affective experiences may also indictate that the requirements concerning *successful* group work (and group members' expectations regarding the present group work) have been met.

However, negative reactions deriving from group work conflicts were also seen, though not implying high values of negative feelings. This was, in turn, identified in case study 1. Due to mis-matches in understandings of focus, motivations and ambitions in one of the groups, two of the group members generally perceived *high* values of uncertainty, frustration and disappointment, also at the *end*, as opposed to the ISP-model. Hence, the negative feelings experienced by these group members in case study 1 did not *diminish* as the project focus became clearer and the group members stopped searching for relevant information. Further, the negative feelings were not *replaced* by positive feelings, e.g. clarity, as a reflection of a perceived 'turning point' (Kuhlthau, 2004). One explanation might be that this group did not know each other very well in advance, hence struggled with problems associated with the group development process.

These findings of affective deviances from the ISP-model correspond well to the findings made by Cheuk Wai-Yi (1998) in her study of 8 knowledge workers' ISP during the preparation of an audit assignment. She found that the knowledge worker reacted *differently* from the individual student in the ISP-model. They started their work with confidence, but this changed into stress and frustration when their ideas did not correspond with the information gathered, implying a delay in their work. Further, when finalising their ideas, they did not feel happy, rather anxious about how their work would be judged and valued and if they would add value to the company. Hence, feelings associated with seeking and use of information were tied closely to whether they were getting their work done within prevailing constraints. This situation is very similar to the group members' in the two case studies, struggling with stress and anxiety due to work task deadlines and exams (assessments) – in addition to the emotional experiences deriving from group work.

To sum up on the answer to research question 1 with reference to both case study 1 and case study 2:

At a *general* level, no differences were seen between individuals' and group members' information search behavior while constructing knowledge. Group members tended to follow the same goals of searching during work task performance. Further, searching

tended to decrease as writing increased. In addition, formulation of focus increased from vague at start to more focused at the end.
However, though searching decreased towards midpoint, no focus had been identified and formulated at that time. This was partly related to *another* work task, partly to the *work task process*, itself, which was found to differ from the work task process in the ISP-model. Further, information seeking activities occurred *parallel* to reading and writing throughout the process, hence were not *replaced* by 'writing', as the ISP-model suggests.
Regarding the affective experiences, the emotional behavior of group members also differed from the individual in the ISP-model, simply because work task and group related factors were at play too and intermingled with group members' affective experiences and personality. For example, affective experiences were found to relate positively to 'group member familiarity'. According to these findings, affective experiences may not *solely* relate to various information seeking activities according to point in process, but may as well be associated with factors deriving from the *work task process* and the *group development process*, as indicated by this study.

10.2 Research question 2

In association with research question 1, the behavior of individual group members have been investigated from a social-cognitive perspective to see whether they would differ or tend to assimilate during time. If the latter was the case, it was hypothesised that groups may constitute an entity or *another* kind of individual in its own right. This interest led to the second research question:

Will intragroup-members demonstrate different activities as well as different cognitive and emotional experiences? If so, in which way do they differ and why?

According to the early social-cognitive approach, individual cognitive structures were assumed to become similar in group settings as a result of shared experiences, context and constraints. In recent years, this homogeneity of group members has been questioned in social-cognition research. Due to this view, social and cognitive dimensions interact, implying that the individual no longer should be seen as a *mere* reflection of social influences, rather as both the goal and the source of influence (Allard-Poesi, 1998). This dynamic process may, in turn, result in a *new* collective

representation within the group. Does this, on the other hand, imply that group members *assimilate* towards this new social identity? According to Fiske (2004), group members tend to depersonalize when identifying with the group, that is, become less oriented towards their individual identity. Assimilating 'self' to the group's prescriptive prototype, the group ideal, provides guides for thoughts, feelings and actions.
With regard to the *intragroup activities* at the various task performance stages in case study 2, *different* activities among group members were identified, particular at the performance stage (focus formulation). This was a result of the other assignment *and* the distribution of subtasks among group members leading to individual task performance at midpoint. As these subtasks *differed* in subject and complexity, *different* work task behavior was, thus, identified at the intragroup level. Moreover, these differences in group members' subtasks also resulted in *different* emotional experiences, e.g. in frustration as a reaction to subtask complexity and lack of focus.
In association with the characteristics of the different work task and subtask activities in case study 2, various and *different* information sources were employed across intragroup members. The characteristics of the delegated subtask also resulted in differences between group members' perceived complexity of *information seeking.* For example, the more complex the subtask, the more difficult it was to judge relevance. Besides (sub)task characteristics, criteria for judging relevance and search closure ('enough' information) also seemed to be associated with group member personality and individual characteristics.
In case study 1, the use and relevance of information sources also differed according to the characteristics of the delegated subtask and the characteristics of the individual group member, though not systematically investigated in case study 1.

Intragroup conflicts may further explain the differentiated behavior (activities, thoughts and feelings), in particular in one of the groups in case study 1. This meant, for example, that this group did not seem to develop into the performing stage, which would have stimulated a more shared and *collective* behavior.

Due to this, social factors were found to affect the individual group member, which contributed to the development of a social identity at the intragroup level. However, intragroup members *did not* assimilate into a collective cognitive unit, simply because social factors (e.g. group conflicts), work task factors (e.g. the distribution of subtasks) and personality interfered. Though the ISP-model according to Kuhlthau (2004) reflects

common behavior of individuals, these findings indicate that a group cannot *a priori* be considered to act as a cognitive unit consisting of *similar* collective representations. Rather, the individual group member's behavior shifted according to *shifts* between *We-modes* and *I-modes* in the problem solving process. This finding is supported by Allard-Poesi (1998), who is stating that various mental representations may exist in groups (or organizations), which continuously are *changing*. Depending on the social-cognitive processes taking place during interactions, group members may develop different forms of collective representations. These phenomena depend also on group members' involvement in the work task, on their participative mode during a decision process and the norms induced by their tasks and by the social context.

The next three research questions discuss the *factors* associated with group members' information behaviour, which in this context refer to *contextual*, *social* and *personal* factors.

10.3 Research question 3

The third research question concerned the first influential factor, the work task:

How is group member behavior related to contextual factors (work task)?

The conceptualization of 'work task' in case study 2 was based on the conceptual matrix of task levels and approaches in Table 3.2 and the Stratified Context-model of 'work task' in Figure 3.1 (chapter 3).
According to this conceptualization, a work task is driven by specific goals and requirements and consists of one or more subtasks (Ingwersen & Järvelin, 2005; Vakkari, 2003). Each subtask may again consist of one or more subtasks. In this case, the work task referred to the assignment, whereas the subtasks referred to group work, information seeking, reading, writing etc. Further, a *process-oriented* approach to work task performance was employed. According to Byström (1997), the work task process has been divided into three task performance stages, which were analogous to start, midpoint and end: work task *construction*, work task *performance* and work task *completion*. With regard to the problem solving process associated with the work task (the assignment), these stages correspond to Vakkari's (2001) three stages of focus formulation with relevance to academic work tasks: the *prefocus* stage, the *focus*

formulation stage and the *postfocus* stage. This division into three stages was preferred to Kuhlthau's 6 stages based on Vakkari's study comparing the levels of the information seeking process with the work task levels of a research proposal process. However, as topic selection turned out to occur *after* group formation, this activity might need to be separated from the prefocus stage to accommodate 'topic selection' as the very beginning of the process, *initiating* pre-focus activities.

In line with case study 1, various forms of *work task activities* (information searching, reading and writing etc.) were performed throughout the work task process in case study 2, which were guided by different aims according to the specific work task stage. For example, the search for 'background information' and 'goal oriented searching' primarily took place at the prefocus and focus formulation stage, whereas re-checking information sources took place at the postfocus stage. Further, 'note-taking' parallel to reading was performed at the prefocus stage, while 'writing on the assignment' primarily took place at the focus formulation stage. In the same way reading activities changed according to the problem stages of the work task process.

At a *general* level, this mapping of activities show how work task activities (or subtasks) differ in type and form during the process as well as how they are integrated into the work task process. When looking at the intragroup level, the task performer did not stay the same throughout the process, implying a shift between individual and group performance. Activities at the *construction* (prefocus) and *completing* (postfocus) stages were in general carried out in common, whereas activities at the *performance* (focus) stage tended to be performed on an individual basis.

The *common* and *collaborative* activities at the construction stage were characterized by planning, searching and reading activities, whereas the common activities at the completion stage were characterized by data analysis and writing activities.

Regarding the *individual* activities at the performing stage, they were found to differ across group members. This derived from an involuntary pause at midpoint due to an other assignment and a division of the assignment into minor parts to be distributed among group members. The division of the work task into subtasks (additive task type) turned out to affect group work in more ways than the shift from collaborative to individual activity. It was found that each distributed subtask constituted the *same* characteristics and activities as the general work task. Hence, each group member had to formulate a focus, search information, read and write on an individual basis, which turned out to constrain the construction of a shared focus of the *collective* product. With

reference to Byström & Hansen (2005) we may say that the individual group member's *work task awareness* was constrained by the focus on the subtask, meaning his or her perception and understanding of purposes and goals of the work task as well as the way the specific work task is integrated into the work context (Hansen & Byström, 2005).

In addition to a difference in needs (group needs/individual needs) and a difference in subtask topics resulting in different work task knowledge, the different nature or complexity of the subtask, itself, also turned out to affect intragroup behavior. For example, group members that were assigned to a normal decision task (e.g. a descriptive part of the assignment) had less difficulties in finding the subtask-focus, find relevant information and start writing than group members that were assigned to a *genuine decision task* (e.g. an analytical part of the assignment). Moreover, these differences in group members' subtasks were also reflected in *different* emotional experiences, e.g. in frustration as a reaction to subtask complexity and lack of focus.
These findings were supported by case study 1 and correspond to the findings in Byström & Järvelin's (1995) study at a city secretarial office in Finland. As task complexity increased, so did the complexity of information needed. Further, affective reactions were found to arise from work task complexity and work task performance.

Based on these findings on work task performance in an academic setting, group based work task performance (the assignment process) may not solely be performed on a collaborative basis, but may be characterized by *social* as well as *individual* activities during time. The social processes at the beginning of the assignment were used to find and explore the topic to assist the formulation of a shared understanding of focus. At the end of the assignment, the social processes were employed to analyse data and generate a collective product. The individual processes at midpoint concerned specific parts of the assignment, but had many characteristics in common with the processes involved in generating the overall product (the assignment), which further increased the perceived complexity of the work task process. Besides the required awareness of the individual subtask, for example, an awareness of the overall work task was required, e.g. implying that other group members' subtasks had to be taken into account in order to construct the *collective* product at the end. Work task knowledge and skills may, however, affect perceptions of task complexity, e.g. as more knowledge on the topic has been gained and a focus has been found.

Due to this shift between work task and subtask complexity according to the shift between collaborative and individual activities, we may state that the problem solving process is *even* more complex when the work task is performed in a group based setting. Further, due to the shifts between individual and collaborative task performance, we may speak of the existence of *We-modes* (group perspective) and *I-modes* (weak group perspective) in group based work task performance.

To sum up on the *work task process*, the shift between collaborative and individual activities has indicated that the academic work task, hence information seeking behavior, cannot be addressed as an unambiguous phenomenon across group members, but needs to be *differentiated* with the collective and the individual subtasks that each individual group member is involved in.

The work task process and the shifts between social and individual activities during work task performance are shown in Table 10.1. The work task performance stages are very similar to Vakkari's stages of the research proposal presented in section 3.2.1 (based on Kuhlthau's ISP-model). Opposed to Vakkari, however, task initiation has been separated from the prefocus stage in the present model to accommodate the very beginning of the process implying group formation and topic selection as the *initiating* activity. The shift between social and individual activities (or sub-tasks) is shown in the work task performer field (in italics).

Activities					
⇨ **Task stages**	Construction		Performance		Completion
⇨ **Work task stages**	Task initiation Topic selection	Prefocus exploration	Focus formulation	Postfocus Writing	Postfocus Writing
Work task performer	*Group*	*Group /individual*	*Group/Individual*	*Individual*	*Group*

TABLE 10.1. The work task performance process and the associated social and individual activities.

As mentioned under the discussion of the first research question, it was found that the division of sub-processes and stages according to formal point in time (start, midpoint and end) of the assignment process did not correspond to group members' *perceptions* of point in time. At midpoint, for example, most of the group members still found the group to be at the end of the construction and prefocus stage. This turned out to be

related primarily to a deadline of another assignment, which required the groups to suspend the present group work for a while. In addition to the involuntary pause at midpoint, the 'other assignment' implied that the groups almost had to start all over again, when they returned to the present group work. Further, the existence of another assignment *parallel* to the present assignment resulted in stress, frustration and a decrease in motivation. The *perceived* midpoint, in turn, was by most of the group members associated with the initiation of 'writing' (on the assignment). The existence of other work tasks parallel to the work task in focus is not a phenomenon associated only with group work in academic settings, but may also occur at an individual level as well as in professional and private contexts. This phenomenon is, however, seldom taken into account at an analytical level in studies of information behavior; rather it tends to be addressed at a conceptual level as part of the social, organisational or cultural environment (e.g. Ingwersen & Järvelin, 2005; Wilson 1983; 1999). As results from this study have indicated, it may be relevant in future to explore the influence from 'other work task'-factors on the task performer's behavior, e.g. activities, cognitive and affective experiences deriving from that. Research into this subject would contribute to and further our understanding of 'task complexity' and how it relates to information behavior.

Besides the negative feelings deriving from task complexity, various factors associated with the work task were found to affect the individual group member's emotional experiences. For example, motivation, topic interest, deadline of assignment, quality of the end product, the work task process itself and end of work task was found to result in feelings such as stress, frustration, disappointment, clarity, satisfaction, dissatisfaction and relief.

The psychological impact from work task factors on the behavior of the individual has already been acknowledged in literature (e.g. Allen, 1996; 1997; Fister, 1992; Heinström, 2002; Onwuegbuzie, 1997; Wilson, 1981; 1999). In group based settings, however, it seems that this *dynamically* interacts with social factors, negatively as well as positively. This is further addressed in the fourth research question.

10.4 Research question 4

The fourth research question regarded the second *influential* factor, group work:

How is group member behavior related to social factors (group work)?

The social dimension of information behavior has been addressed both at the individual level and at the group level (intragroup level and across participating groups), which also is reflected in the discussion of results.
However, the results regarding the intragroup characteristics and their impact on group member behavior will not be addressed here, but in relation to the fifth research question on personality.

One important aspect of group work is group formation and development, e.g., which motives guide group formation – social factors, cognitive factors or both? As stated in the theoretical part (Blair, 1991), groups form a basic unit of work activity, involving the work task (and the associated problems to be solved) as well as the process of group work itself, by which the group should act as a unit.
In this study, group formation was found to be motivated by *social factors* in that 'familiarity with other group members' was mentioned by all group members as the primary reason for group formation. All group members knew each other in advance, though not in all cases from previous group work. Though no task-oriented motives were mentioned as the primary reason, e.g. 'congruent topic interests', 'familiarity' was not only socially rooted. When group members explained the implications of familiarity it generally turned out to be related to work task factors, e.g. whether group members believed the other group members would possess the same ambitions, cognitive level, working approach, ethics and discipline as them. Furthermore, the importance of the cognitive outcome and of the group work process itself was stressed by many of the group members. This may, however, also be seen as examples of psychological needs associated with the three main motives that according to Fiske (2004) are at play in group interaction: belonging (need for social identity), understanding (need for socially shared understanding) and controlling (need for group control). In a group context, this corresponds to Allen's (1996; 1997) *basic needs*. This need for belonging, establishing a social identity and to be in control of the group work, may also be seen in connection

with the group member characteristics, due to which most of the group members scored high values of neuroticism, indicating an insecure nature. The psychological implications of familiarity were found to affect the group work process positively as well as negatively in both case study 1 and case study 2. This was for example demonstrated in relation to the *group development process*, due to which individuals gradually become performing group members in accordance with the group's move through 4 stages. At the forming and storming stages, group members generally tend to be vulnerable to social identity, and conflicts may arise if personalities clash. At the norming and performing stages, group members begin to feel secure in the group and to freely express opinions as well as discuss more openly. In addition, group norms have been established at that point, which supports group performance positively. The group development process may be seen in association with the various positions that a 'collective mind' may take. According to Allard-Poesi (1998) different forms of collective representations may exist in groups dependent on the dynamics of social influences. Expressions of collective positions may for example reflect a majority disposition, an average disposition or a new position. However, polarization resulting in new position is the only result deriving from *true* collaboration. Depending on the stage of the group development process, these positions may be more or less stimulated. Concerning the group work context, these stages of the group development process may be seen as existing *parallel* to the general work task stages (Figure 10.1) and the information seeking stages (ISP). This implies that the cognitive and affective experiences associated with the ISP, may as well be related to the group development process. Hence, the forming/storming stages may be associated with cognitive ambiguity and feelings of uncertainty, whereas the norming/performing stages may be associated with cognitive specificity and feelings of confidence and clarity. When looking at the group members in cases study 2, however, *none* of the group members perceived high values of uncertainty at the start of group work, though most of them were characterized by high neuroticism. In turn, they demonstrated generally medium to high values of confidence throughout the process. This in combination with group members' own explanations indicates that feelings of uncertainty tend to diminish when group members know each other prior to the start of group work. In addition to this, 'familiarity' in this context turned out to be associated positively with many of the factors mentioned by group members with regard to successful group work. With regard to the present study, it may thus be argued that these groups did not start the group work proces at the forming stage, but almost 'jumped' into the norming stage and proceeded

from there. Cognitive experiences, however, still complied with the work task initiation level. Due to personal conflicts occurring in group C, elements of forming/storming behavior were also identified, particular affecting two of the group members. In line with case study 2, the group members that knew each other in advance in case study 1 (group B), demonstrated none to medium values of uncertainty at the start. In contrast, the group members of the other group (group A) who did not knew each other in advance, had difficulties throughout the process, e.g. in reaching a consensus on focus and goal of the assignment and agree on ambitions. These factors were all among the factors mentioned by group members as constraints to successful group work. These difficulties were, for example, reflected in high values of uncertainty, frustration and disappointment, particular regarding two of the group members. In this case, it may be argued that though group A started the group work process at the forming/storming stage, it did not at any point reach the performing stage, which would have implied a spirit of cooperation, coordination and commonly understood procedures and mores.

In two cases, however, 'familiarity' was also found to have a negative impact on group work. In the one case, it was perceived as a barrier to speak out freely and being frank with group members, e.g. when feedback to written text was given. In the second case, one of the group members (involved in a personal conflict) explained this conflict as related to a matter of shift in roles, that is, from being the private person to being the professional person attitude, which the other involved group member now was reacting upon.

Hence, group formation based on social motives (relationship oriented) may in some cases conflict with the cognitive motives (work task oriented), thus not in all cases have a positive impact on the group and work task process.

As opposed to individual problem solving, groups as problem solving units employed various social subfunctions or cognitive cooperative strategies to produce a professional and satisfying collective product (cognitive and social motives). In the initial process of focus formulation, mind-mapping was used by all groups as a meta-cognitive strategy (planning and facilitation of problem solving) and for collective induction (dissemination of ideas, knowledge etc.). In addition to this, mindmapping constituted an important instrument to discover and resolve any differences in how group members conceptualized the problem at hand. One group additionally used email to share each group member's interpretation of the focus in the assignment, which also enabled them to discover differences in understandings. Further, group discussions served as a

medium through which problems were conceptualized. Discussions took place at physical group meetings, particular at the beginning and at the end. Other forms of meetings were also identified in the study such as 'the ad-hoc meeting' and the 'digital meeting', but they were primarily used for 'here and now' messages or questions.
At the prefocus stage, in particular, various *collaborative* information activities were employed for collective induction and as generative learning strategies (social construction of knowledge). At group meetings, in particular, information was communicated, discussed, exchanged and shared, primarily to help formulate a collective goal and obtain a shared understanding of the problem in focus. From the middle to the end, information was primarily communicated and discussed according to specific elements of the assignment, e.g. based on the reading of other group members' writings. With regard to sharing, elements of strategic and paradigmatic sharing (Talja, 2002) were found in case study 2, whereas only elements of strategic sharing were found in case study 1. This was partly related to the problems in one of the groups and the result of a distributed approach to group work that may as well be characterized as 'atomistic,' in line with Limberg (1998). Directive forms of sharing were also found, though only as a one-way process, when supervisors provided groups with information or documents with perceived relevance to the subject. Directive forms of sharing were not preferred by groups in case study 1.

Various form of information sources were also employed, which were found to differ according to the work task stage. With regard to the employment of *personal information sources*, 'group members' were preferred in addition to books throughout the process. Based on the collaborative information behavior demonstrated in the groups, 'group members' acted (and were perceived) as reliable, authoritative information sources by sharing their knowledge with the other group members.
In line with the study by McNeese (2000) comparing individuals' behavior with group behavior, the groups in case study 2 employed *collective induction* and *meta-cognitive* strategies as well as relied on *external group memory* (group knowledge) – in particular at the prefocus stage They were actively engaged in generating a shared focus and understanding of the problem at hand, e.g. shown in the various forms of collaborative information activities and strategies. This behavior has many elements in common with the information behavior identified in studies of *complex* problem solving in teams (e.g. Bruce et al., 2003; Hertzum, 2000; 2002; Talja, 2002). In addition, it may also be related to the *characteristics* of the groups, themselves. With reference to Limberg's

(1998) study implying the identification of ‘holistic’ and ‘atomistic’ approaches to group work, the groups in case study 2 corresponded in many ways to the characteristics of the holistic groups. For example, they acknowledged the value of group work and considered group work as a collective task towards a shared goal, which would imply various group activities to succeed. In addition, they considered the establishment of a shared knowledge base as very important, though they did not succeed in developing shared relevance criteria. The holistic approach to group work is further supported by the fact that group members in general experienced high levels of motivation at the prefocus stage, hence, stimulating *collaborative* activities.

According to McNeese (2000), ‘shared groups’ (with no dominating group members) tend to demonstrate *a distributive approach* to problem solving implying for example that information more often derive from group member knowledge and that group work is stratified according to situational needs, abilities and roles. This approach may also be an efficient way to problem solving, e.g. by sharing the work load among group members and taking advantage of individual group members’ strengths, but may as well lead to what McNese (2000) calls ‘loosely coupled’ teamwork. By ‘loosely’ means the opposite of collecting information and generating knowledge on the *same* topic.

The ‘distributed intelligence’ strategy was also employed by group members in case study 2, e.g. when the search activity or the reading activity of collected information was distributed among group members, and when parts of the assignment were distributed to individual group members. Ideally, this distribution should imply that *less* resources needed to be spent on the assignment as a whole and that individual group members’ search task knowledge and skills could be shared and compensate for group members with lower search task knowledge. However, as a shared focus and understanding of the assignment goal was essential to generate a *collective* product, the employed forms of distribution turned out to be a barrier to this. For example, the distribution of ‘reading’ at the prefocus stage resulted in different conceptualizations that needed to be communicated and exchanged properly at group meetings to obtain a shared understanding. The distributed ‘search’ resulted in some cases in *different* ideas about the potential relevance of various kinds of information. Further, the characteristics of the delegated parts differed (simple/complex), which implied different working approaches and knowledge, which further complicated the generation of a shared understanding of the overall focus. Finally, the involuntary pause at midpoint due to the ‘other assignment’ turned out to be a barrier to regularly meetings and group communication, supporting the generation of shared understandings. Based on these

findings, the distribution of group work in each of the three groups implied a shift between *We-modes* and *I-modes* that turned out to constrain the cooperative cognitive process necessary to form the group intelligence in support of the group as a problem solving unit. By group intelligence is meant "…the functional intelligence of a group of people working as a unit…[which] relates to the teams ability to process, interpret, manipulate and use information" (Akgün, Lynn & Yilmaz, 2006, p. 213).

At the individual level, 'the individual group member' was found to constitute various *roles* in addition to the roles assigned due to individual characteristics. Group members acted as 'cognitive units' contributing to the construction of a shared understanding and outcome. By disseminating, communicating, exchanging, sharing and discussing information, personal knowledge and meta- knowledge they both acted as information *sources* and as *mediators* of information. By discussing issues related to the work task, e.g. the topic, the problem, the structure or each group member's part of the assignment, they also acted as inspirators, co-players and discussion partners – the words they used to characterize the supervisor's role, particular at the prefocus stage. This should, however, be seen in connection with the specific group development stage, as these roles may not occur or have the same authority in groups at the forming/storming stages. With regard to the 'mediator' role, group members often constituted the role of the *informal* mediator, which according to Kuhlthau (2004) was associated with family or friends, as opposed to *formal* mediators, which referred to teachers, supervisors and librarians. According to Kuhlthau's studies of the ISP-model in an academic setting, *informal* mediators were more often preferred to formal mediators. This was also found in Limberg's (1998) study, where students more often sought guidance and counselling from friends and family than from the librarian, who rather acted as locator. The preference for informal mediators may be associated with psychological factors, e.g. that you do not want to exhibit your lack of knowledge or lose face. As demonstrated by Warner & Procaccino (2004), persons serving as information sources or mediators during a problem solving process also seemed to help reduce uncertainty. The preference for informal mediators may also be associated with the mere difficulties of expressing a need that you are may not yourself be capable of specifying, e.g. as part of the prefocus stage. In addition, it may be related to the information seeker's expectation of what the librarian or the system is able to deliver. Further, it may derive from a mismatch in work task knowledge between information seeker and librarian that make the need negotiation process difficult and time consuming. These factors have been

investigated in studies under the cognitive viewpoint (e.g. Belkin, Oddy & Brooks, 1982; Ingwersen, 1982; Taylor, 1968) and may explain why the *group members* in case study 2 were employed as informal mediators. However, given that the mediator plays an important role in groups' knowledge construction and problem solving, it might indicate that this role should be assigned a more formalized role as it turned out from the comments made by group members in the interviews that the group setting in itself may also reduce the need for formal mediators. Like Kuhlthau's 'zones of intervention', it would be relevant to explore more systematically how group members as formal mediators may assist, guide, enable and otherwise intervene in other persons' information seeking process that further may help reduce uncertainty. Hence, more research is needed in future into the role of the group member as *formal with-in mediator* of knowledge and knowledge construction in group work.
Social factors also turned out to affect group members' affective experiences, positively as well as negatively. This is further discussed in relation to the next research question concerning *personality*.

10.5 Research question 5

The fifth and final research question concerned the third *influential* factor, personality.
This question was formulated, as personal factors appeared to have an impact on group members' individual behavior in case study 1 that further could explain *differences* in behavior. In case study 2, the personal aspect has been addressed in association with group work, work task performance and information seeking based on the following question:

How is group member behaviour related to individual factors (personality)?

The personality factor that most significantly was reflected in and affected by group members' behavior was neuroticism on a continuum from 'low' to 'high'. Though most of the group members turned out to be persons with high levels of neuroticism, they generally demonstrated *low* affective values of uncertainty and *high* values of confidence, even at the prefocus stage. As mentioned earlier, social and professional *familiarity* with other group members seemed to be the primary reason for that, often resulting in feelings of safety and relaxation with regard to the work task. Hence, in this case the social impact from group work turned out to affect the individual group

member positively, meaning that due to the group work situation, insecure persons in general tended to experience low values of uncertainty, low to middle values of stress and middle to high values of confidence throughout the process. According to Fiske (2004) people tend to depersonalize, when they identify with a group, which implies that they become less oriented to their individual identity, while orienting more toward being a prototypic member of the group. Assimilating 'self' to the group's prescriptive prototype, the group ideal, generally reduces feelings of uncertainty by providing guides for thoughts, feelings and actions. However, when compared to the more secure group members, insecure persons in general showed higher values of stress across the process. According to Ryckman (1982), personality indicates a *tendency* to behave and react in a specific way that, however, may be more or less visible dependent on the situation. As such, insecure persons are more likely to feel anxiety in e.g. stressful situations than calm and secure persons.

The pause at midpoint caused by the other assignment as well as the personal conflicts were also reflected most significantly by the insecure group members' behavior, e.g. shown in higher affective values of stress and frustration and in some cases in lower values of clarity and confidence. The behavior derived from the work task can be seen as an example of *context dependent* behavior, due to which aspects of neuroticism became visible in group members' behavior. It may also be seen as an example of an outer influencing context factor according to which information behavior may change (Wilson, 1999). In the same way, the negative impact from the interpersonal conflict can be seen as an example of an outer influencing social factor – or a social with-in factor from the perspective of the individual group member (Allen, 1996; 1997).

In addition to the high levels of neuroticism, most of the insecure persons were also characterized by high levels of openness to experience, low levels of agreeableness and middle levels of conscientiousness. This combination of personality factors was not identified in Heinström's (2002) study of the relationship between personality, information behavior and study approach. Only low levels of neuroticism in combination with low levels of agreeableness were found among art students that implied critical thinking in association with security. According to Costa & McCrae (1992), however, there are some aspects of high neuroticism that may enhance certain types of critical thinking, as neuroticism also can be a measure of being irritable and defensive.

As demonstrated e.g. by Heinström (2002), personality traits may also vary according to academic discipline. E.g. art students often demonstrated high levels of critical ability, whereas natural science students tended to be introvert persons. In the same way, the combination of neuroticism, critical thinking, openness to experience and efficiency (or part of them) as demonstrated in the present study may be associated with characteristics of library and information science (academic disciplin).

However, this relationship between personality factors in combination with the low affective values of uncertainty and the medium to high values of confidence throughout the process may also be seen as indicators of an *uncertainty-oriented* behavior with regard to cognitive gaps. According to the theory of uncertainty orientation (e.g. Sorrentino & Roney, 2000; Sorrentino, Hodson & Huber, 2001), people may be characterized on a continuum from certainty-oriented (CO) to uncertainty-oriented (UO). For UOs, the preferred method of handling uncertainty is to seek out information and engage in activity that will directly resolve uncertainty and *attain* clarity. CO's on the other hand, tend to develop a self-regulatory style that circumvents uncertainty confrontation. Such persons will generally undertake activity that does not involve uncertainty, hence, *maintain* clarity. If, however, they are confronted with uncertainty situations, they will rely on others and/or heuristic devices over more direct methods of resolving uncertainty.
Given group members' uncertainty-orientation towards cognitive gaps, *neuroticism* may not in all cases be associated negatively with nervousity. This statement is supported by Costa & McCrae (1992). In addition to this, social factors were found to affect the *personal* behavior of group members positively as well as negatively.

When looking at group members' information behavior in association with personality, many of the characteristics found in Heinström's study were also shown by group members' behavior in this study. When looking at the insecure persons, psychological barriers to information seeking were for example demonstrated by search closure as a way to avoid stress, confusion or frustration or due to lack of time. The opposite behavior was also seen, meaning that no search closure could be settled in fear of overlooking relevant information, which may, however, also be an aspect of low search task knowledge (Kuhlthau & Tama, 2001). Besides showing the impact from psychological factors, as proposed by Wilson (1997; 1999), it also shows that search

closure may not always imply that enough information have been found from a cognitive point of view.
As another psychological barrier to information seeking, a tendency towards behavior provoked by 'history of failure' was seen, particular demonstrated by one group member. The searcher's expectations of his own capabilities were more influential than the actual skills he possessed, which is an initial obstacle to successful database searching (Bandura, 1986). In this case, the implication was that the other group members generally performed the searches. Hence this person could rely on the other's search task knowledge and skills, but it is likely that he would have experienced the searching situation differently (e.g. more difficult, stressful etc.) if he had not been with a group.
Examples of difficulties in judging relevance were also seen among the insecure persons. However, it turned out to be related to work task factors, e.g. the delegation of subtasks, and social factors, e.g. no consensus in the group about relevance criteria.

Besides the similarities, however, group members did not in many cases demonstrate the same information behavior as the students in Heinström's study. One explanation may be the mere difference between individual and group based information behavior. As seen, group based problem solving evoke by nature several collaborative activities, which tended to affect the individual group member's behavior. For example, B3 stated that she *more* critically assessed relevance of documents in the group than on an individual basis. Moreover, the importance of group member familiarity was found to affect the behavior of the individual positively, also in the case of insecure persons. In connection to group work, the work task process implied a delegation of the assignment into subtask that implied different approaches to information behavior. Group member A2, for example, with high neuroticism did not perceive any difficulties in judging relevance, simply because her delegated part was a simple subtask. Further, the involved domain (academic discipline) may affect information behavior. For example, library and information science (LIS) students may tend to spend more effort on searching and relevance judgement than students from other disciplines (Heinström's study). This difference in disciplines was, for example, demonstrated in a comment by C3 stating that she would have used the Internet more if she had not been a LIS-student. Finally, the study by Heinström involved a large number of subjects and was primarily based on a quantitative study approach, whereas the present qualitative case study

involved 10 subjects. It may, thus, be difficult to generalize from the relative small number of participants in this study to other studies.
This is not a rejection of Heinström's work; rather, this study have demonstrated the impact from situational and contextual factors in addition to the methodological factors just mentioned. The situational aspect in relation to personality has already been stressed (e.g. by Heinström, 2002; Ryckman, 1982). Further, the impact from social factors on personality has been acknowledged (Heinström, 2002, p. 255). However, there is a need for investigating *how* personality is affected by social settings, e.g. when the individual is situated in a group work context. For example, as it turned out that most of the group members had high values of neuroticism and the primary reason for group formation turned out to be 'familiarity', there might exist a relation between group formation and personality, which affects group work positively. Some indications have been found in this study already, but in future the *interaction* and *relation* between personality and collaborative information behavior should be further explored.

10.6 The Group Member in Context (GMIC)-model

As revealed from the discussion of findings above, the behavior of the individual group member was to some extent similar to the individual in the ISP-model; however, group members also *differed* in many ways from the ISP-model, differences, which were found to be related to *contextual*, *social* and *personal* factors.

The *work task process* was found to involve shifts between collaborative and individual activities resulting in different subtasks, which differed in topic and complexity. This further resulted in an identification of *We-modes* and *I-modes* in work task performance with regard to focus formulation, information searching, relevance judgement, reading and writing – all constraining the work task performance process of finding a shared focus and producing a collective product. In addition to this, *other* work tasks (another assignment), was also found to affect the work task performance process in case study 2. For example, none of the groups had formulated a focus at midpoint though searching had decreased and writing increased. According to the stages of the ISP-model this generally implies a 'turning point'. This may also indicate that group members had entered the presentation stage without a clear focus of the assignment. In addition, it was found that the formal points in time according to the *assignment* process (start, midpoint and end) did not correspond with group members' perception of the work task

stages and progress of the assignment. The formal midpoint, for example, was perceived as the end of the the initial period.
The impact from shifting work task modes and 'other work tasks' was also reflected in group members' cognitive and affective experiences.
In line with the ISP-model, however, focus was found to increase during the work task process.

Moreover, the *group development* process was found to affect the individual group member's behavior in the group.
Some groups were characterized as *forming/storming* groups, implying conflicts and difficulties in finding a group identity, which meant that they did not seem to reach the final and performing group stage. This implied, for example, difficulties in focus formulation and negative feelings of uncertainty, frustration, stress and disappointment, even at the end, in contrast to Kuhlthau's model. Hence, forming/storming groups did not seem to proceed from the third stage of the ISP (focus formulation stage), implying that they had entered the presentation stage without a clear focus. In contrast, the *norming/performing* groups generally formulated a focus and experienced positive feelings of confidence and low levels of uncertainty and frustration, also at the beginning of the ISP. The fact that group members of these groups were familiar with each other from the outset (professionally and personally) seemed to imply that these groups actually 'jumped' into the 'norming' stage right at the beginning, though not implying that a focus had been formulated at the stage of 'task initiation'. Hence, these groups seemed to pass through *all* the ISP stages (as perceived by *them*).
Based on these findings, it may be argued that the ISP-model is *sensitive* to the group development process when applied in a group based setting.

Personal factors have not been addressed by Kuhlthau (2004), hence have not been implemented into the ISP-model. Though Heinström (2002) has identified relationships between information behavior and personality (based on the ISP-model), the result from this study have demonstrated a more diversified picture, hence no clear pattern of group member behavior in association with personality. This may be a result of the research design (too many personality dimensions or a wrong mapping between statements of information behavior and personality traits); but it may also be a result of the the group work context, meaning for example, that many of the group members seemed to be affected positively as well as negatively by their participation in group work. Due to

this, patterns of group member behavior and personality at a general level could not be identified.

Following from this, the *work task process* as well as the *group development process* were found to affect the individual group member's activities and cognitive and emotional experiences, which differed from the individual information seeker modeled in the ISP-model. This has lead to the development of the *Group Member In Context (GMIC)-model* (Figure 10.2), which should be seen as an *extension* of the ISP-model with regard to *group member* behavior in *academic* settings.

At the *overall* level, the model shows the *activities* (task and work task processes, stages and performers) and the *experiences* associated with work task performance during *time*. At the horizontal level, the stages in the model reflect the activities and experiences from the *start* of group work and to the *end.* This part of the model has already been presented and discussed in relation to research question 3 on the work task factor in group member behavior.

The stages at the *generic task level* correspond to the stages suggested by Byström (1997*)*: construction, performance, and completion. The stages at the *work task level* correspond primarily to the stages suggested by Vakkari (2001) (except for task initiation) as respons to the outcome of his comparative study between the ISP and the research process: Task initiation, prefocus, focus formulation and postfocus. The work task stages have been assigned to the general task levels in accordance with group members' experience of the work task process. This implies, for example, that the postfocus stage has been assigned both to the performance stage and the completion stage. As part of the work task stages, the specific activities associated with each stage have been assigned in correspondance with the identified shifts between *We-modes* and *I-modes* during the work task process. This is indicated in the model by the work task performer stages ('group', 'individual' or both).

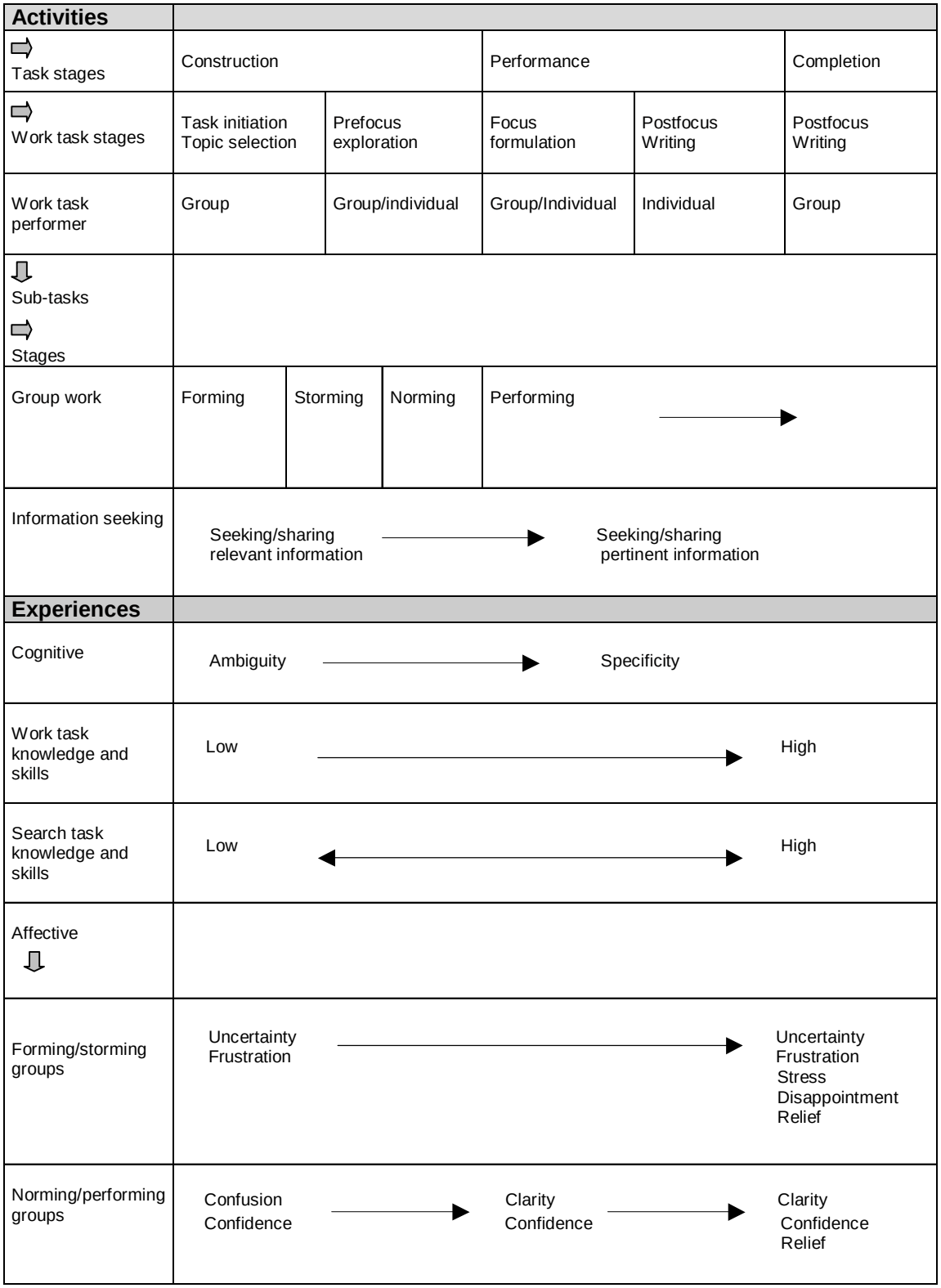

FIG. 10.2 The Group Member In Context (GMIC)-model

(legend in text)

At the *subtask* level, the *group work* process has been divided into the four development stages the *forming*, *storming*, *norming* and *performing* stages. They are presented in the way they tended to occur during group members' work task performance process. According to the information seeking process in the model, group members (group/individual) were engaged in seeking and sharing activities, primarily during the task construction and performance stage. Sharing has been added to the ISP as this strategy generally were applied as part of collaborative problem solving. During the information seeking process, however, group members' behavior generally shifted from seeking/sharing *relevant* information to seeking/sharing *pertinent* information, in line with the ISP-model.

These activities and stages are further associated with various *experiences* (cognitive and affective).
In correspondence with the ISP-model, the *cognitive* experiences as reflected in focus formulations, changed from *ambiguity* at the task initiation stage to *specificity* at performance stage. The *work task knowledge and skills* increased accordingly, which is shown by the scale from 'low' to 'high'. With regard to *search task knowledge and skills*, the double-arrow indicates that group members in the role of information seekers may change from expert to novice, and vice versa, dependent on the specific information source or system in use.
The *affective* experiences differed from the ISP-model, which tended to be related to the group development process. Hence, feelings associated with *forming/norming* groups were generally *negative* (at start and end), whereas feelings associated with *norming/performing* groups generally were *positive* (at start and end). Though, the latter stages *preceed* the forming/norming stages according to the group development process, the fact that groups knew each other (professionally and personally) implied that these groups tended to *start* group work at these stages as a matter of group member familiarity, hence the presentation of the norming/performing stages at the *start* of the work task process (at the bottom of the model).

At the vertical level, the stages can be seen as existing *parallel* to ecah other, meaning that the various stages *dynamically* interact with each other during the work task performance process. For example, at the 'forming' stage of group work, the work task is 'initiated', involving 'topic selection', and performed on a 'collaboratively' basis

(group). At that point in the process, cognitive experiences (focus) are characterized by 'ambiguity' and the task performer's work task knowledge and skills are 'low'. Depending on the specific information source or system in use, the search task knowledge and skills may be either 'low' or 'high' at that point. With regard to the affective experiences at start, forming/storming groups may experience feelings of uncertainty and frustration, whereas norming/performing groups may experience feelings of confidence and confusion.

The GMIC-model has focused on the behavior and factors appearing to be *common* across groups, in line with Kuhlthau (2004); hence *individual* deviations due to differences in personality and situational factors have not been taken into account. The *personal* factor is, however, important to consider in studies of group based information behavior, as already indicated by this study. The implications of the model are further addressed under section 11.2 on contributions.

11 Conclusion, contribution and recommendations for future work

This final chapter presents the main results of the study (case study 1 and 2) and concludes with regard to the five research questions. In addition, the contributions derived from the thesis will be presented, and suggestions for further research in future will be outlined based on the results of the present study.

11.1 Conclusion

The aim of the thesis has been to explore how existing models of information (seeking) behavior may apply to individuals engaged in a group-based setting; hence to what extent models are reasonable *complete* representations of the reality they seek to model. In this case, the focus has been on Kuhlthau's ISP-model modeling the behavior of the individual information seeker during the process of knowledge construction in connection to the production of written assignments. The underlying question behind the 5 research questions was whether the ISP-model would apply to a group based academic setting, implying information seeking behavior at the *group* level as well as at the *individual group member* level. The 5 research questions guiding the study concerned 1) similarities/differences between individual and group based information behavior 2) similarities/differences in intragroup member behavior 3) impact from work task factors 4) impact from social factors and, finally, 5) impact from personal factors.

During two longitudinal and qualitative case studies, the present study has investigated the 'group member in situation' behavior in relation to the process of generating a *collective* product (the assignment). By behavior is meant the *activities* as well as *cognitive* and *affective* experiences derived from the group work and the work task process. By 'situated group member' is meant the individual acting in the role of a 'group member', engaged in a *collaborative* problem solving process involving information (seeking) behavior.

Based on the findings of the study, *similarities* were found between the behavior of group members and the individual in the ISP-model. For example, group members followed the general stages of information search behavior in the model, as well as followed the cognitive experiences associated with focus formulation during the work task process. Further, searching tended to decrease towards midpoint as writing on the assignment tended to increase.

However, the individual group member's behavior also *differed* from the individual in the ISP-model; differences, which were found to be related to *contextual, social* and *personal* factors.

For example, the *work task process* was found to shift between *We-modes* (group) and *I-modes* (individual), affecting the associated subtask performance accordingly. This shift between group and individual activities was found to be related to the interference from 'another work task' and the administrative distribution of assignment elements (subtasks) to individual group members. This further affected the information seeking process of the individual group member in that information seeking differed according to the We-modes and I-modes of the work task process. In addition to this, group members' cognitive and emotional experiences were also affected by the shift in work task mode, e.g. resulting from the different nature of group members' subtasks.
Regarding group members' *work task activities*, various reading and writing activities were identified throughout the process *parallel* to the information seeking activities. These activities also contributed to knowledge construction. In addition, search closure and the assessment of 'enough' information was *not* primarily motivated by cognitive factors related to focus formulation; rather it was motivated by factors associated with the *work task*.
Hence, the work task and information seeking process differed from the work task process as experienced by group members. Further, information seeking activities were not replaced by writing activities, as the ISP-model tends to suggest, but occurred parallel to work task activities. In addition, search closure does not necessarily imply that a focus has been formulated.

Further, the *group development process* was found to affect the individual group member's activities and cognitive and emotional experiences. Some groups were characterized as forming/storming groups, implying conflicts and difficulties in establishing a

group identity, and hence did not seem to reach the final and performing group stage. This implied, for example, difficulties in focus formulation and negative feelings of uncertainty, frustration, stress and disappointment, even at the end, in contrast to the ISP-model. Hence, it may be stated that forming/storming groups did not seem to proceed from the third stage of the ISP-model (focus formulation stage). In contrast, the groups characterized as norming/performing groups generally formulated a focus and experienced positive feelings of confidence as well as low levels of uncertainty and frustration, also at the beginning of the ISP. The fact that group members of these groups were familiar with each other from the outset (professionally and personally) further seemed to imply that the groups almost 'jumped' into the 'norming' stage right at the beginning, although thereby not implying that a focus had been formulated at the stage of 'task initiation'.

Hence, the ISP-model was found to be sensitive to the group development process when applied in a group based setting.

As opposed to individual problem solving, groups as problem solving units employ various social subfunctions or cognitive cooperative strategies to produce a professional and satisfying collective product (cognitive and social motives). However, though social factors were found to affect the individual group member, which further contributed to the development of a social identity at the intragroup level, intragroup members did *not* assimilate into a collective cognitive unit, simply because social factors (e.g. group conflicts), work task factors (e.g. the distribution of subtasks) and personality interfered.

Hence, groups cannot be considered a priori to act as cognitive units consisting of similar collective representations. Rather, we may speak of groups consisting of cognitive units (group members) interacting between an individual and a group level.

Regarding *affective experiences*, the emotional behavior of group members also *differed* from the individual in the ISP-model, simply because perceived feelings *dynamically* interacted with *work task* and *group based factors*. For example, affective experiences (e.g. uncertainty) were found to relate *positively* to 'group member familiarity' and negatively to mis-matches in group members' approaches to group work.

Hence, affective experiences may not solely relate to various information seeking activities according to point in process, but may as well be associated with factors deriving from the work task process and the group development process. However, a

sharper distinction between feelings towards the construction process and feelings towards group work might have clarified the implications of these findings.

As the ISP-model aims at reflecting *common* behavior of individuals, the *personality factor* of information seeking has not been taken into account by Kuhlthau (2004). However, Heinström's (2002) study based on the ISP-model of personality in research students' information seeking behavior showed different types of information behavior and study approaches, which were associated with differences in personality factors. Thus, Heinström's work can be seen as *indications* of behavior according to type of personality during the ISP. Besides identifying similarities between individuals in Heinström's study and the group members in the present study, group members *differed* in many cases from the behavior associated with individuals. This has been suggested as relating to the mere *difference* between individual and group based problem solving (the work task process), between individual and collaborative information behavior, the difference in research design, e.g. between research domains and between quantitative and qualitative studies.

Hence, though similar personality factors were identified between individuals in Heinström's study and the present study, the differences in behavior have stressed the importance of taken into consideration situational as well as contextual factors when behavior deriving from personality is investigated – in line with Wilson (1999).

These findings of the study have led to the final conclusion that the ISP-model may not fully comply with the problem solving process of group members, involving information seeking behavior at the *group level* as well as at the *individual group member* level. This conclusion has further led to the presentation of the *Group Member In Context (GMIC)*-model, an *extention* of the ISP-model with respect to group based information behavior in *academic* settings.

As indicated by the model and the result of the thesis, it may finally be argued that work task performance is even more complex when it is performed in a group based setting.

11.2 Contributions

The overall aim of this thesis has been to explore whether Kuhlthau's model of the individuals' information seeking process would apply to group members, when taking into consideration social, contextual and individual factors. The aim was motivated by Wilson (1999), stressing the need of having *adequate* representations of the reality they seek to model in information behavior research. Based on two qualitative case studies it was concluded that the ISP-model did not fully comply with the problem solving process and information behavior of individual group members. To arrive at this conclusion, the underlying theoretical and empirical framework has led to various conceptual models that may as well be seen as *methodological contributions* to future studies of information behavior, in particular in group based academic settings. These contributions are briefly presented below, but should be seen in addition to the contributions presented in the introduction regarding design of information systems.

Modification of Wilson's (1999, p. 257) 1996-model of the information-seeking box
To indicate the *interactive* nature of information seeking and search behavior – from a user-oriented point of view – an *arrow* has been added to the search box in Wilson's conceptual 1996-model of information behavior.

The Stratified Context Model – modification of Ingwersen & Järvelin's (2005, p. 261) generalized model of information seeking, retrieval and behavioral processes.
Ingwersen & Järvelin have developed a conceptual model of the actors and interactions involved in information behavior, hence involving a *contextual* point of view. This model serves as a methodological framework assisting researchers in the formulation of research problems and the identification of implied actors. The various actors have been represented at a *general* level. However, as each general actor consists of various specific *types* of actors, some of these may be perceived as more influential to the actor in focus than others. Hence, various *layers* have been introduced to demonstrate *contextual distances* in the general model. For example, the group and the work task as part of the general environmental context (actor) has been separated out from this context to indicate their distance to the group members, hence their influencing role in this study of group members' information behavior in context. Based on that, the general model by Ingwersen & Järvelin has been modified by adding different layers, hence named the *Stratified Context Model.*

The conceptual matrix of task levels and approaches

Based on the task theory deriving from studies by Byström & Hansen (2005)and Ingwersen & Järvelin (2005), a *generic* conceptual matrix of task levels and approaches has been developed. It combines *levels of analysis* (context I, context II and situation) with *element in focus* (environment, task or subtask) and *approaches* (objective or subjective). In addition, each level of analysis may be addressed either as an *abstract* construction or as a *concrete* set of activities. In this way, the model shows how the various task concepts are interrelated, which further may assist researchers in specifying the task levels in focus of a given study, independent of the domain of research.

The Group Member In Context (GMIC)-model – modification of and supplement to Kuhlthau's (1981; 2004) ISP-model

As mentioned in the conclusion, the ISP-model did not fully describe groups' and group members' information behavior, which has led to an extension of the model, referred to as the *Group Member In Context (GMIC)*-model. It aims at showing how group based information behavior in academic settings is integrated into the work task process and the group development process. Besides demonstrating these different processes and the associated activities, cognitive and affective experiences, it also shows which elements that might be important to take into consideration in group based information behavior research. For example, the work task (and subtask) behavior and complexity according to shifts between We-modes and I-modes in task performance should be considered. Further, the relationship between group member (and group) behavior according to the group development stages should be addressed.

The employment of diaries in information behavior research

As one of the research tools used to collect data on group members' activities, cognitive and affective experiences, the diary form was employed in both case studies. However, the two diaries differed in form and implementation, which has contributed with experiences and reflections concerning data collection on information behavior – in general and with regard to collaboratively information behavior.

11.3 Recommendations for future work

Though this thesis has resulted in various methodological contributions, it has also pointed to many phenomena or areas of research that should be further explored in future studies of information behavior in group based settings

The reseach design has rested on Allen's (1996; 1997) integrated research approach, e.g. implying that *many* influencing factors have been addressed: group (group work), individual (personal) and the context (work task) in combination with information behavior. It has provided rich data on all dimensions, but may also have constrained the control of factors, hence made it more difficult to point out from the data if some of the dimensions are more important to group based information behavior than others. Therefore, as the case study approach applied in this study has focused on a *qualitative* study of *few* subjects, it may in future be relevant to validate *statistically* if the behavior demonstrated by group members' will correspond to group member behavior explored in a quantitative *large scale* study. In this relation, the GMIC-model may serve as a conceptual framework for identifying which issues (or factors) to address in association with group members' information behavior.

Moreover, as the focus in this study has been on library and information science students, it would be interesting to see if and how group members' behavior would differ if the *domain* changed. For example, as Heinström's (2002) study showed, students' personality and study approach tended to differ according to domain, which affected their information behavior accordingly.

Further, the focus has been on students and groups in *academic* settings. However, how will the GMIC-model apply to team members and teams in *professional* settings. Project teams, for example, are also constrained by work task factors, such as deadlines, complexity and 'other work tasks' as well as social factors, such as the team development process. One question to ask is, for example, whether teams in the same way as groups will experience and demonstrate *shifts* between *We-modes* and *I-modes* in *work task performance*, affecting behavior accordingly. In addition, as project teams often form groups *involuntarily*, it should be interesting to investigate this matter in relation to the group development process, e.g. in the light of the findings regarding 'familiarity' as addressed below or team member characteristics.

'*Familiarity with other group members'* was found to have an impact on group members' behavior in a positive way, in particular. This was for example demonstrated in association with the group development process and with regard to personality factors.
Those groups that knew each other in advance, tended to act like norming/performing groups, whereas the opposite type of groups tended to demonstrate characteristics of forming/storming groups. It may be related to basic psychological needs associated with group interaction: belonging (need for social identity), understanding (need for socially shared understanding) and controlling (need for group control) (Fiske, 2004). In future, however, this relation between *familiarity and positive group performance* should be further validated, hence contributing to our understanding of the problem solving process in group based settings.
Though the impact from social factors on personality has been acknowledged (e.g. Heinström, 2002), no study has investigated how *personality* of students is affected by the social setting, e.g. when individuals are situated in a group work context. As it turned out, for example, that most of the group members had high values of neuroticism and the primary reason for group formation turned out to be 'familiarity', it might indicate that a relation exists between group formation and personality, which tends to affect group work positively. Some indications have been found in this study already, but in future the *interaction* and *relation* between *personality* and *collaborative* information behavior should be further explored.

The existence of 'other work tasks' parallel to the work task in focus is not a phenomenon associated only with group work in academic settings, but may also occur at an individual level as well as in professional and private contexts. This phenomenon is, however, seldom taken into account at an analytical level in studies of information behavior; rather it tends to be addressed at a conceptual level as part of the social, organisational or cultural environment (e.g. Ingwersen & Järvelin, 2005; Wilson 1983; 1999). As results from this study have indicated, it may be relevant in future to explore the influence from 'other work task'-factors on the task performer's behavior, e.g. the activities, cognitive and affective experiences deriving from that. Research into this subject would contribute to and further our understanding of 'task complexity' and how it relates to information behavior.

Given that the *mediator* plays an important role in groups' collective knowledge construction and problem solving, it may be argued that the mediator should be assigned a

more *formalized* role. Like Kuhlthau's (2004) 'zones of intervention', it would be relevant to explore more systematically how group members as *formal* mediators may assist, guide, enable and otherwise intervene in other persons' information seeking process which may as well help reduce uncertainty. Hence, more research is needed in future into the *role of the group member* as *formal with-in mediator* of knowledge and knowledge construction in group work.

Based on experiences from the two case studies, the *diary method* was found to generate useful data on information behavior processes in group based settings over time – in particularly with regard to *activities* associated with information seeking, the work task and group work. As stated by other studies, the diary-interview method proved to be important - both when bringing thoughts and reflections into light and to triangulate research on information behavior.
Besides the findings associated with design and employment of diaries in information behavior research, more research is, however, needed into the usage of the diary method in studies of *group based information behavior*. E.g. how should collaborative information behavior in context at best be recorded, and how should the diary at best be employed as a *meta-cognitive* tool to contribute to the process of construction at the *group* level.

List of abbreviations

ASK	Anomalous State of Knowledge
CIB	Collaborative Information Behavior
CIR	Collaborative Information Retrieval
CIS	Collaborative Information Seeking
GMIC	Group Member In Context
ISP	Information Search Process
LIS	Library and Information Science
SC	Stratified Context

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Appendices

Appendix 1: Invitation to participate, case study 1

9. april 2002

Invitation til at deltage i et pilotstudie i foråret 2002

Som et led i et ph.d.-projekt om kontekstbaseret informationssøgning og social navigation skal jeg her i foråret udføre et pilotstudie om individer og gruppers informations- og søgeadfærd over tid i forbindelse med opgaveskrivning. Studiet tager bla. udgangspunkt i Carol Kulthaus Information Seeking Model (ISP) om studerendes skiftende stadier og søgeadfærd i forbindelse med udarbejdelse af en opgave.
Formålet er at kunne identificere eventuelle forskelle mellem individers og gruppers informationsadfærd og mulige årsager hertil, idet det vil have en betydning for hvordan vi designer systemer, herunder brugergrænseflader.

I den forbindelse vil jeg meget gerne have din deltagelse. Du er bla. valgt fordi du enten arbejder alene eller i en gruppe, du er tilknyttet holdet i København og du har ikke mig som vejleder.
Jeg er interesseret i følge jer på sidelinien, mens i arbejder med projektopgaven ved bl.a at udstyre jer med et sæt logbøger, som I løbende udfylder. Derudover vil jeg mødes med jer en gang undervejs samt en gang efter aflevering af opgaven. Det vil foregå som individuelle interviews af ca. 45. min. varighed.

Som introduktion til projektet holdes et første indledende møde **mandag d. 22.4 kl. 13.00-14.00.** Lokale oplyses senere. Her vil du få en nærmere introduktion til projektet samt brugen af logbogen. Inden mødet vil du blive bedt om at udfylde en spørgeformular i afkrydsningsform.

Jeg håber meget på din lyst til og interesse i at deltage. Du vil selvfølgelig være sikret fuld anonymitet ligesom din medvirken vil blive behandlet fortroligt.

Til orientering er Peter Ingwersen og Morten Hertzum, Afdelingen for Systemanalyse på Risø, tilknyttet projektet qua deres rolle som henholdsvis hovedvejleder og projektvejleder.

Jeg glæder mig til at høre fra dig,

Med venlig hilsen

Jette Hyldegård

Appendix 2: Questionnaire, case study 1

Spørgeskema - grupper

Vedr. dig og din foreløbige informations- og søgeadfærd i relation til projektopgaven

Dato

Navn/ID **Alder** år

Har du tidligere arbejdet i grupper
Ja ☐ Nej ☐

Har du tidligere arbejdet alene
Ja ☐ Nej ☐

Hvad er grunden til at du enten arbejder alene eller i en gruppe

Hvordan foregår kommunikationen i gruppen
Flere kryds kan sættes

E-mail ☐ Møder ☐ Telefon ☐ Andet ☐

Hvor tit er du i kontakt med nogle eller alle af gruppens medlemmer
Daglig ☐ Flere gange om ugen ☐ Ugentlig ☐ Aldrig ☐

Opgaven emne og problemstilling
Beskriv kort projektopgavens emne og problemstilling

Hvad er dit kendskab til emnet i forvejen

Stort ☐ Noget ☐ Lidt ☐ Intet ☐

Brug af informationskilder
Marker hvilke kilder du foreløbig har benyttet i forbindelse med projektopgaven med ***et tal fra 1-5***, der angiver vigtigheden (1=laveste værdi)

Trykte kilder Personer i gruppen Personer uden for gruppen

OPACs Biblioteket på skolen Web-sider Mail-lister

E-tidsskrifter Andre typer af databaser Ingen

Hvis brug af andre kilder end de anførte, kan de noteres her

Hvad har du benyttet kilderne til

Forståelse af emnet/problemområdet ☐ Afgrænsning af emnet/problemområdet ☐

Nærmere udforskning af emnet/problemområdet ☐ Formulering af opgavens fokus ☐

Indhentning af information vedr. opgavens fokus ☐ Afsluttende informationssøgning ☐

Andet

Erfaring med Internet
1 år eller derunder ☐ 2-3 år ☐ 4-5 år ☐ mere end 5 år ☐ Ingen ☐

Hvad mener du om følgende udsagn?

Marker med et tal fra 1-5 din enighed i følgende udsagn:

Jeg har en klar forståelse af opgavens fokus

Meget enig	Enig	Noget enig	Lidt enig	Uenig
5 ☐	4 ☐	3 ☐	2 ☐	1 ☐

Jeg føler mig usikker og frustreret

Meget enig	Enig	Noget enig	Lidt enig	Uenig
5 ☐	4 ☐	3 ☐	2 ☐	1 ☐

Jeg føler mig motiveret for at arbejde med projektopgaven

Meget enig	Enig	Noget enig	Lidt enig	Uenig
5 ☐	4 ☐	3 ☐	2 ☐	1 ☐

Jeg vælger overvejende mine informationskilder ud fra praktiske hensyn

Meget enig	Enig	Noget enig	Lidt enig	Uenig
5 ☐	4 ☐	3 ☐	2 ☐	1 ☐

Jeg finder personlige informationskilder mere troværdige end andre informationskilder

Meget enig	Enig	Noget enig	Lidt enig	Uenig
5 ☐	4 ☐	3 ☐	2 ☐	1 ☐

Har du kommentarer m.v. i øvrigt?

Appendix 3: Diary, case study 1

This is the diary that was kept for four weeks. Each project-related activity should be recorded in the numbered fields at page 1 (P1) together with the associated sources used and the time spent. There are more sources to the right than shown at page 1. At page two (P2), the project-related activities should be categorized, and the associated aims of search activities and the perceived feelings should be marked.

Name Date

Describe activity ***Mark the information sources used for each activity, if any***

P1

#	Activity	Printed			Group members			Other persons			RSLIS library		
		< 10min	10-30 min	> 30 min	< 10min	10-30 min	> 30 min	< 10min	10-30 min	> 30 min	< 10min	10-30 min	> 30 min
1		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
...													

Categorise your activities/tasks

p2

#	Reading	Writing	Searching	Talk with supervisor	Talk with group member	Talk with other persons	Telephone call	Meeting	E-mail	Use of IT equipment	Other
1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
...											

Aim of activity:

Seek background information ☐ Seek specific information ☐ Discuss project/topic with others ☐ Explore the topic ☐ Seek advice ☐ Other ☐ If other, please specify

Mark with a number from 1 (low) to 5 (high) the degree of the feeling(s) which characterises your situation right now:

Serenity Optimism Relief Uncertainty Anxiety Doubt Frustration Disappointment
Other If other, please specify

Appendix 4: Interview guide 1-3, case study 1

Interview-guide I – grupper (29.4 +30.4 +1.5 2002)

Opgaven

Hvornår begyndte du at tænke på opgaven
Emnevalg – hvordan foregik det
Hvornår gik du for alvor i gang

Prøv at beskriv hvordan du typisk arbejder med din opgave (+ aktiviteter), begyndt at skrive... (fysisk)
Hvilke aktiviteter er centrale for dig i forbindelse med opgaven

Er der noget der er særlig svært i forbindelse med opgaven

Ville det gøre en forskel, hvis du arbejdede i en gruppe/alene

Gruppen

Hvordan foregår arbejdet i gruppen
(organisering, mere kontakt med nogle end andre, får relevant information fra gruppen, du ikke havde bedt om)

Hvor meget betyder det at mødes (i forhold til andre kommunikationsformer)

Søgeadfærd

Hvordan vil du karakterisere dig selv som informationssøger: novice, ekspert eller ..., måder at søge på)

Hvad har du gjort for at blive klogere på opgavens emne (informationsadfærd)
Søgning – hvad søger du på, hvordan, brug af kilder ; hvilke tanker gør du dig om dit informationsbehov p.t. og hvordan du skal få det opfyldt ...)
Kontakt med andre uden for gruppen...

Hvordan vil du karakterisere relevansen af den information du har fundet indtil nu (måske, noget, lidt, meget, ikke)

Informationskilder

(prioritere mellem kilder; hvad får dig til at vælge en trykt kilde, en personlig
kilde; erfaring, vane, praktisk...); hvad får dig til at stole på en trykt kilde, en personlig kilde; hvor meget betyder det at mødes med folk...).

Oplevelser/følelser

Hvordan vil beskrive forløbet indtil nu hvis du skulle sætte følelser på; hvordan er det i dag (ændret sig over tid)

Hvordan oplever du arbejdet i gruppen

Hvad bruger du din vejleder til (spiller han/hun en rolle – hvilken og hvordan ...)
Husk, at spørge til kryds i sidste skala + "personer i gruppen"

Interview-guideII – grupper (16.5 + 17.5 2002)

Opgaven

Hvad går din opgave ud på, hvis jeg spørger dig i dag

Prøv at beskriv hvordan du typisk arbejder med din opgave (+ aktiviteter), begyndt at skrive... (fysisk)
Hvilke aktiviteter er centrale for dig i forbindelse med opgaven pt

Er der noget der er særlig svært i forbindelse med opgaven

Gruppen

Hvad bruger du møderne med de andre til (hvorfor nogle aktiviteter med nogle af gruppens medlemmer – forskel mellem møder med alle og enkelte)

Hvad taler I om på sidste møde

Hvorfor taler I fremfor at skrive

Hvorfor mødes I fysisk (hvad betyder det ift. at mødes (i forhold til andre kommunikationsformer)

Hvordan foregår arbejdet i gruppen

Søgeadfærd

Hvordan vil du karakterisere dig selv som informationssøger: novice, ekspert eller ..., måder at søge på)

Hvad har du gjort for at blive klogere på opgavens emne (informationsadfærd)
Søgning – hvad søger du på, hvordan, brug af kilder ; hvilke tanker gør du dig om dit informationsbehov p.t. og hvordan du skal få det opfyldt ...)
Kontakt med andre uden for gruppen...

Hvordan vil du karakterisere relevansen af den information du har fundet indtil nu (måske, noget, lidt, meget, ikke)

Informationskilder

Hvilke kilder (prioritere mellem kilder; hvad får dig til at vælge en trykt kilde, en personlig
kilde; erfaring, vane, praktisk...); hvad får dig til at stole på en trykt kilde, en personlig kilde; hvor meget betyder det at mødes med folk...).

Hvilken rolle spiller din vejleder pt.

Oplevelser/følelser

Hvordan vil beskrive situationen nu hvis du skulle sætte følelser på

Logbogen

Hvordan bruger du logbogen

Interview-personer

[redacted]
Overblik/focus=personer i gruppen?
Nogle "formål med aktivitet ikke udfyldt"?
Skrivning=trykte kilder?

[redacted]
Check telefonsamtale=trykt kilde
Diskussion af opgave, men % d. 11.5 + 12.5

[redacted]
0605: Optimisme=2, men ingen andre følelser noteret

[redacted]

Lettelse steget efter vejledning? (3->4)
Få dage efter faldet – forklaring?
Hvorfor kun noteret optimisme og usikkerhed?

Interview-guide III – grupper (30.5 + 31.5 2002)

Opgaven

Hvad handler din opgave om, hvis jeg spørger dig i dag

Prøv at beskriv hvordan arbejdet med opgaven foregik indtil afleveringstidspunktet (aktiviteter) begyndt at skrive... (fysisk)

Hvilke aktiviteter var centrale for dig til sidst

Er der noget der var særlig svært i forbindelse med opgaven

Er du tilfreds med resultatet

Gruppen

Prøv at beskriv hvordan gruppearbejdet foregik til sidst

Hvad handlede jeres møder om

Hvordan har du brugt de andre I gruppen til (forskel mellem møder med alle og enkelte)

Hvordan kommunikerede I sammen

Hvad har været det bedste ved gruppearbejdet

Hvad har været det værste ved gruppearbejdet

Er der tidspunkter hvor det har været særlig gavnligt at være i en gruppe

Arbejde i gruppe igen

Individ

Hvordan har du kommunikeret med andre

Hvad har I talt om

Hvad har været det bedste ved at arbejde alene

Hvad har været det værste ved at arbejde alene

Er der tidspunkter hvor det ville have været særlig gavnligt at have været i en gruppe

Arbejde alene igen

Søgeadfærd

Hvordan vil du karakterisere dig selv som informationssøger: novice, ekspert eller ... , måder at søge på)

Hvad har du gjort for at blive klogere på opgavens emne (informationsadfærd)
Søgning – hvad søger du på, hvordan, brug af kilder ; hvilke tanker gør du dig om dit informationsbehov p.t. og hvordan du skal få det opfyldt ...)
Kontakt med andre uden for gruppen...

Hvordan vil du karakterisere relevansen af den information du har fundet indtil nu (måske, noget, lidt, meget, ikke)

Informationskilder

Hvilke kilder var centrale for dig til sidst – hvorfor
(prioritere mellem kilder; hvad får dig til at vælge en trykt kilde, en personlig kilde; erfaring, vane, praktisk...); hvad får dig til at stole på en trykt kilde, en personlig kilde; hvor meget betyder det at mødes med folk...).

Vejleder

Hvilken rolle har din vejleder spillet til sidst.

Oplevelser/følelser

Hvordan vil beskrive situationen op til afleveringstidspunktet, hvis du skulle sætte følelser på

Metode

Logbogen - hvordan har du brugt logbogen
Rækkefølge af aktiviteter
Hvad lægger du i kategorierne under "formål"
Nogle følelser du vil karakterisere forløbet med som helhed
Har de været relateret til noget bestemt

Hvordan har du oplevet at deltage i pilotstudiet

Appendix 5: Supervisor feedback, case study 1

Vurdering af fokus i de studerendes projektopgaver

Anfør med et tal fra 1-5 graden af fokus i de studerendes opgaver:
(1=mindste værdi)

Gruppemedlem	Lærer	Fokus
A1	L1	
A2	L1	
A3	L1	
B1	L2	
B2	L2	

L1= Lærer 1
L2= Lærer 2

Case studie 1, foråret 2002, Jette Hyldegård

Appendix 6: Key to diary coding system (information sources and activities), case study 1

Nøgle til informationskilder og aktiviteter

Informationskilde	**1-8**
Trykt	1
Gr.medl.	2
Andre pers.	3
DB-bibliotek	4
Opacs	5
Andre databaser	6
Web-sider	7
Andre kilder	8

Kategori	**1-11**
Læsning	1
Skrivning	2
Informationssøgning	3
Tale m. vejl.	4
Tale med gr.medl.	5
Tale med andre personer	6
Telefonsamtale	7
Møde	8
e-mail-komm.	9
Brug af IT	10
Andet	11

Appendix 7: Invitation to participate, case study 2

5. oktober 2004

Invitation til at deltage i et case-studie i efteråret 2004

Som led i et ph.d.-projekt om *gruppemedlemmers informationsadfærd* skal jeg her i efteråret gennemføre et casestudie af 3-4 gruppers informationsadfærd i forbindelse med deres opgaveskrivning.

Studiet tager bla. udgangspunkt i Carol Kuhlthaus informationssøgningsmodel (ISP) om studerendes skiftende adfærd i forhold til det givne stadie i en opgaveproces. Hidtidige studier har fokuseret på individets informationsadfærd, men uden at inddrage sociale faktorers eventuelle indvirkning. Det er således ikke tidligere undersøgt om det at være individ i en gruppe (gruppemedlem) måtte have nogen indflydelse på informationsadfærden. Ligeledes har faktorer vedr. selve opgaven (fx en studieopgave) kun i mindre grad været inddraget i tilsvarende Kuhlthau-inspirerede studier af informationsadfærd.

Formålet med dette studie er således at undersøge hvordan sociale såvel som opgaverelaterede faktorer indvirker på gruppemedlemmers informationsadfærd.

Varighed og omfang

Undersøgelsen varer fra uge 41 til uge 1 i 2005. Omfanget af hver deltagers indsats er ca. 6 timer.

Hvem

Deltagerne er studerende (gruppemedlemmer) fra 5. semesters B-kurser, hvor der udarbejdes en studieopgave på baggrund af et projekt.

Hvad skal du konkret gøre

For at få et indblik i hvad hvert gruppemedlem gør og oplever i tilknytning til arbejdet med studieopgaven er der valgt forskellige metoder til indsamling af data. Det indebærer bla. at du i løbet af perioden skal:

- Udfylde et demografisk skema (navn, alder, køn etc.)
- Udfylde et personlighedstestskema (resultatet vil du kunne få tilsendt efterfølgende)
- Udfylde et proces-skema (3x)
- Udfylde en 'dagbog' i en uge (3x)
- Deltage i et interview á ca. 45 min. varighed (3x)

Oversigt over fordeling af aktiviteter

	Oktober				November				December					Jan
	41	42	43	44	45	46	47	48	49	50	51	52	53	1
Proces-skema skal udfyldes og returneres			X				X				X			
Dagbog skal udfyldes				X				X					X	
Interviews (interval)					X				X					X

Motivation for deltagelse

Som deltager i undersøgelsen vil du bla. opnå følgende:

- Få foretaget en personlighedstest, hvis analyse og resultat du efterfølgende vil få tilsendt til eget brug, fx. til brug for en jobsamtale mv.
- Reflektere over og lære om egen og andres adfærd i gruppesammenhæng
- Modtage et honorar på 600 kr.

Anonymitet

Din deltagelse vil være helt anonym og alle data vedr. dig vil blive behandlet fortroligt.

Introduktionsmøde

Mandag d. 18. oktober kl. 13-15 afholdes der en introduktion til undersøgelsen for de deltagende grupper.

Hvis din gruppe ønsker at deltage

I må gerne kontakte mig snarest (helst før efterårsferien) på email: jh@db.dk

Med venlig hilsen

Jette Hyldegård

Appendix 8: Consent of participation, case study 2

København, 18. oktober 2004

Danmarks Biblioteksskole

Birketinget 6
DK-2300 København S
Tel +45 32 58 60 66
Fax +45 32 84 02 01
E-mail db@db.dk
www.db.dk

Sohngårdsholmsvej 2
DK-9000 Aalborg
Tel +45 98 15 79 22
Fax +45 98 15 10 42
E-mail dbaa@db.dk
www.db.dk

CVR-nr. DK 62 63 17 16

SAMTYKKE-ERKLÆRING

Undersøgelse af *gruppemedlemmers informationsadfærd i forbindelse med opgaveskrivning*

Ledet af lektor Jette Hyldegård, Institut for Informationsstudier

1. Jeg bekræfter hermed at have læst og forstået introduktionen til ovenstående undersøgelse dateret d. 18.oktober 2004 samt at have haft mulighed for at stille spørgsmål til undersøgelsen. ☐

2. Jeg er klar over at min deltagelse er frivillig og at jeg har ret til at forlade undersøgelsen uden at mine rettigheder krænkes ☐

3. Jeg er enig i at deltage i ovenstående undersøgelse ☐

4. Jeg ønsker at modtage et sammendrag af undersøgelsens resultat. ☐

Navn _____ Dato _____

Underskrift _____

ROYAL SCHOOL
OF LIBRARY
AND INFORMATION
SCIENCE

Appendix 9: Demographic survey, case study 2

Demografisk skema

Spørgsmålene vedrører personlige forhold samt dine erfaringer mht. gruppearbejde og informationssøgning.

Dato: _____

A. Personlige oplysninger

1. Navn: _____

2. Alder: _____år

3. Andre uddannelser: _____

B. Vedr. gruppearbejde

4. Har du tidligere arbejdet i grupper
   Ja ☐ (1) Nej ☐ (2)

5. Har du tidligere arbejdet alene
   Ja ☐ (1) Nej ☐ (2)

6. Hvad er dit kendskab til de andre gruppemedlemmer
   Kender alle ☐ (4) Kender to ☐ (3) Kender tre ☐ (2.) Kender ingen ☐ (1.)

6a. Kendskab til gruppemedlemmer fra tidligere gruppearbejde
   Ja ☐ (1) Nej ☐ (2)

C. Vedr. projektopgaven

7. Hvad er dit kendskab til emnet for projektopgaven
   Stort ☐ (4) Noget ☐ (3) Lidt ☐ (2) Intet ☐ (1)

D. Vedr. informationssøgning

8. Erfaring med søgemaskiner
   Stort ☐ (4) Noget ☐ (3) Lidt ☐ (2) Ingen ☐ (1)

9. Erfaring med databasesøgning
   Stort ☐ (4) Noget ☐ (3) Lidt ☐ (2) Ingen ☐ (1)

10. Jeg finder hvad jeg leder efter:
Altid ☐ 4 Ofte ☐ 3 Sjældent ☐ 2 Aldrig ☐ 1

11. Jeg bliver hurtig utålmodig, hvis jeg ikke finder det jeg leder efter

Meget enig	Enig	Noget enig	Lidt enig	Uenig
☐	☐	☐	☐	☐
5	4	3	2	1

12. Jeg foretrækker dokumenter der bekræfter egne tanker og ideer

Meget enig	Enig	Noget enig	Lidt enig	Uenig
☐	☐	☐	☐	☐
5	4	3	2	1

13. Jeg foretrækker dokumenter der skaber nye tanker og ideer

Meget enig	Enig	Noget enig	Lidt enig	Uenig
☐	☐	☐	☐	☐
5	4	3	2	1

14. Nogle gange støder jeg på dokumenter, uden at jeg har søgt bevidst efter dem

Meget enig	Enig	Noget enig	Lidt enig	Uenig
☐	☐	☐	☐	☐
5	4	3	2	1

15. Jeg finder ofte dokumenter ved at snakke eller rådføre mig med andre

Meget enig	Enig	Noget enig	Lidt enig	Uenig
☐	☐	☐	☐	☐
5	4	3	2	1

16. Få, velvalgte dokumenter er nok til at skrive en projektopgave

Meget enig	Enig	Noget enig	Lidt enig	Uenig
☐	☐	☐	☐	☐
5	4	3	2	1

17. Nogle gange har jeg simpelthen ikke tid til at søge efter dokumenter

Meget enig	Enig	Noget enig	Lidt enig	Uenig
☐	☐	☐	☐	☐
5	4	3	2	1

18. Jeg foretrækker at benytte dokumenter der er let tilgængelige på internettet

Meget enig	Enig	Noget enig	Lidt enig	Uenig
☐	☐	☐	☐	☐
5	4	3	2	1

19. Artikler, der publiceres i tidsskrifter er pålidelige

Meget enig	Enig	Noget enig	Lidt enig	Uenig
☐	☐	☐	☐	☐
5	4	3	2	1

20. Hvad der publiceres i bøger, er facts man kan have tillid til

Meget enig	Enig	Noget enig	Lidt enig	Uenig
☐	☐	☐	☐	☐
5	4	3	2	1

21. Jeg er som regel enig, når jeg hører nogle argumentere for noget

Meget enig	Enig	Noget enig	Lidt enig	Uenig
☐	☐	☐	☐	☐
5	4	3	2	1

22. Informationssøgning er en tids- og arbejdskrævende fase af projektarbejde

Meget enig	Enig	Noget enig	Lidt enig	Uenig
☐	☐	☐	☐	☐
5	4	3	2	1

23. Jeg venter gerne to uger på et interurban lån

Meget enig	Enig	Noget enig	Lidt enig	Uenig
☐	☐	☐	☐	☐
5	4	3	2	1

(Dokumenter= *trykte kilder*, såsom artikler, bøger, websider, manualer, encyklopædier og aviser samt *personlige kilder*)

Appendix 10: Process survey, case study 2

Proces-skema 1

(Udfyldes og afleveres **fredag d. 22.10**)

Navn_____ **Dato**: _____

Proces-skemaet vedrører tre aspekter af projektopgaven:
A. *Projektopgaven som 'produkt'*, B. *Informationssøgning* og C. *Gruppearbejde*.
Til hver del er en række spørgsmål, der har til formål at beskrive dit arbejde med projektopgaven som det kommer til udtryk på *nuværende tidspunkt*, herunder hvordan du oplever arbejdet med projektopgaven.

A. Projektopgaven

Her beskrives forhold der specifikt vedrører projektopgaven (selve produktet)

1. Kognitive aspekter af opgaven

1.1 Hvad er titlen på dit projekt pt.

_____

1.2 Beskriv kort emnet for dit projekt

_____

_____

_____

1.3 Marker med et **x** din enighed i nedenstående udsagn

Jeg synes det er svært at være kritisk i forhold til det, jeg læser
Meget enig ☐ 5 Enig ☐ 4 Noget enig ☐ 3 Lidt enig ☐ 2 Uenig ☐ 1

Jeg synes det er nemt at se hvad der er essentielt i det jeg læser
Meget enig ☐ 5 Enig ☐ 4 Noget enig ☐ 3 Lidt enig ☐ 2 Uenig ☐ 1

2. Aktiviteter i forbindelse med projektopgaven

2.1 Hvilken projektaktivitet (overordnet) er du optaget af i øjeblikket
(flere krydser kan sættes)

Udvikle en projektplan ___
Søge information ___
Læse litteratur og baggrundsmateriale ___
Planlægge indsamling af data (metodeovervejelser mv.) ___
Dataindsamling ___
Dataanalyse ___
Fortolkning af resultat ___
Skrive på opgaven ___
Færdiggøre opgaven ___
Andet ___

2.2 Hvilken delaktivitet er du optaget af i øjeblikket
(flere krydser kan sættes)

Læse pensumstof ___
Læse nye kilder ___
Skrive noter til litteratur ___
Læse noter ___
Skrive på indledning ___
Skrive på problemformulering ___
Skrive på metode ___
Skrive på teori ___
Skrive på konklusion ___
Samle bibliografiske referencer ___
Diskussion af emne (hvad) med gruppemedlemmer ___
Diskussion af emne med vejleder ___
Diskussion af projektopgave (hvordan) med gruppemedlemmer ___
Disussion af projektopgave med vejleder ___
Lave en indledende søgning ___
Lave en uddybende søgning ___
Lave en afsluttende søgning ___
Andet ___

3. Affektive aspekter ved projektopgaven

3.1 Beskriv med et tal fra 0 (lav) til 5 (høj) hvordan du har det med projektet i øjeblikket (**Alle** felter skal udfyldes; 0=følelse kan ikke genkendes)

Fortrøstningsfuld (tryg) ___
Tilfreds ___
Optimistisk ___
Lettet ___
Motiveret ___
Klarhed ___
Andet ___

Forvirret ___
Tvivl ___
Stresset ___
Frustreret ___
Usikker ___
Bekymret/urolig ___
Skuffet ___

Eventuelle kommentarer til ovenstående

_____

_____

B. Informationssøgning

Her beskrives forhold der specifikt vedrører din informationssøgning

1. Aktiviteter i forbindelse med informationssøging

1.1 Hvad består din informationsopgave i på nuværende tidspunkt
(flere krydser kan sættes)

Identificere informationsbehov ___
Formulere det specifikke emne ___
Identificere det generelle emne ___
Søge baggrundsinformation (i begyndelsen af projektopgaven) ___
Udforske emnet (undervejs i projektopgaven, 'grave sig ned' i emnet) ___
Søge målrettet på det specifikke emne ___
Skimme/skanne informationskilder ___
Søge specifikke informationer (fx. bibliografiske) ___
Tale med andre med viden om emnet ___

Genchecke kilder for ny information ___
Andet ___

2. Valg og brug af informationskilder

2.1 Marker de informationskilder (type) du anvender i forbindelse med opgaven *i øjeblikket* samt deres vigtighed

KILDER	Anvender (sæt x)	1-3 (3 mest vigtig)
Tidsskrifter på Internettet		
Andet materiale på Internet		
Trykte tidsskrifter		
Bøger		
Encyklopædier		
Aviser		
Undervisere		
Andre fagpersoner Vejleder		
Andre studerende		
Gruppemedlemmer		
Familie og venner		
Undervisning		
Andre kilder		

2.2 Marker hvilken kilde (form) du evt. har anvendt til at finde information (flere kryds kan sættes)

Biblioteket på skolen (fysisk) ___
Biblioteket på skolen (Internet) ___
Andre biblioteker (fysisk) ___
Andre biblioteker (elektronisk) ___
Online katalog (opac) ___
Andre databaser ___
Nyhedsgrupper ___
Internet (www) ___
Andet ___

2.3 Hvilke kriterier anvender du, når du vurderer om et dokument er relevant for din opgave, dvs. om du vil læse og muligvis bruge dokumentet i opgaven (subjektiv relevansvurdering)

KRITERIER	Anvend-er (sæt x)	1-3 (3= mest vigtig)
Dokumentets udseende		
Kilden er relativ ny		
Dokumentet virker grundigt og gennemarbejdet		
Dokumentet giver oversigtsinformation		
Sproget er klart og flydende		
Kilden (fx et tidsskrift) er veletableret og kendt		
Forfatteren er respekteret indenfor sit felt		
Dokumentet er af høj videnskabelig værdi		
Andet:		

3. Kognitive aspekter ved informationssøgning

3.1 Marker med et **x** din enighed i nedenstående udsagn

Jeg synes det er let at se om en kilde er relevant for mit projekt
eller ej
Meget enig ☐ 5 Enig ☐ 4 Noget enig ☐ 3 Lidt enig ☐ 2 Uenig ☐ 1

4. Affektive aspekter ved informationssøgning

4.1 Marker med et **x** hvordan du oplever informationssøgning på nuværende tidspunkt

	1	2	3	4	5	
Let	☐	☐	☐	☐	☐	Svært
Stessende	☐	☐	☐	☐	☐	Afslappende
Simpelt	☐	☐	☐	☐	☐	Komplekst
Tilfredsstillende	☐	☐	☐	☐	☐	Frustrerende
Andet: _____	☐	☐	☐	☐	☐	_____

C. Gruppearbejde

1. Aktiviteter i gruppen

1.1 Hvad foregår der i gruppen i øjeblikket (beskriv kort)

_____

_____

_____

_____

1.2 Hvor tit har du kontakt med din gruppe

Daglig ☐ 4 Flere gange om ugen ☐ 3 Ugentlig ☐ 2 Andet ☐ 1

1.3 Hvordan foregår kommunikationen i gruppen (flere krydser kan sættes)

Møder ___
Email ___
Telefon ___
Andet ___

2. Kognitive aspekter af gruppearbejde

2.1 Marker med et **x** din enighed i nedenstående udsagn

Jeg har stor glæde af de andre gruppemedlememmers viden om emnet
Meget enig ☐ 5 Enig ☐ 4 Noget enig ☐ 3 Lidt enig ☐ 2 Uenig ☐ 1

Jeg er meget afhængig af de andre gruppemedlemmers feedback på hvad jeg gør
Meget enig ☐ 5 Enig ☐ 4 Noget enig ☐ 3 Lidt enig ☐ 2 Uenig ☐ 1

Vejlederen har en konstruktiv indvirkning på gruppearbejdet
Meget enig ☐ 5 Enig ☐ 4 Noget enig ☐ 3 Lidt enig ☐ 2 Uenig ☐ 1

3. Affektive aspekter af gruppearbejde

3.1 Hvordan vil du karakterisere stemningen i gruppen

Meget god ☐ 4 God ☐ 3 Mindre god ☐ 2 Dårlig ☐ 1

Kommentarer til besvarelsen i øvrigt

_____

_____

Appendix 11: Diary, case study 2

This is the first diary out of three that was handed out to the participants at three selected points in the process. After an introduction to the diary, any project-related activity should be described in the numbered fields together with the start and end of the activity. In the end of the diary, affective experiences should be recorded with a number from 0 (not recognized) to 5 (High).

Dagbog 1 (udfyldes uge 44)

Navn_____ **Dato**: _____

I 'dagbogen' skal du kort beskrive dine *daglige aktiviteter* i relation til projektopgaven. Det kan være aktiviteter i tilknytning til dit arbejde med selve opgaven (produktet), gruppearbejde eller informationssøgning. Du skal desuden beskrive hvordan du har det med opgaven den pågældende dag (affektive oplevelser).

Vejledning

- Dagbogen skal udfyldes *hver dag* i en uge (7 dage). Hvis ingen aktiviteter anføres et '%' i første 'aktivitetsrubrik'. 'Affektive oplevelser' skal *altid* udfyldes
- *Aktiviteter* beskrives løbende (kronologisk, så vidt muligt)
- *Affektive oplevelser* beskrives sidst på dagen
- Returner dagbogen til JH *mandag* efter en dagbogsperiode

I skemaet skal du kort beskrive den pågældende aktivitet samt angive et ca-start- og sluttidspunkt (alternativt aktivitetens varighed). I eksemplet nedenfor kan du se hvordan en aktivitet kan komme til udtryk. Bemærk, at nogle aktiviteter kan overlappe i tid.

Nr	**AKTIVITET**	Starttids-punkt	Sluttids-punkt
1	Jeg har skrevet på indledningen til..	10	11.30
2	Besvarede en mail fra XX...	11	11.15
3	Vi holdt møde i dag hos NN og diskuterede...	12.30	14
4	Jeg var på biblioteket og...	14	15
5	Vi mødtes med vejleder og...	15	16

Nr	**AKTIVITET**	Starttids-punkt	Sluttids-punkt
1			
2			
3			
4			

Nr	AKTIVITET	Starttids-punkt	Sluttids-punkt
5			
6			
7			
8			
9			
10			

AFFEKTIVE OPLEVELSER

Beskriv med et tal fra 0 (lav) til 5 (høj) hvordan du har det med projektet i øjeblikket
(**Alle** felter skal udfyldes; 0=følelse kan ikke genkendes)

Fortrøstningsfuld (tryg) ___
Tilfreds ___
Optimistisk ___
Lettet ___
Motiveret ___
Klarhed ___
Andet ___

Forvirret ___
Tvivl ___
Stresset ___
Frustreret ___
Usikker ___
Bekymret/urolig ___
Skuffet ___

Eventuelle kommentarer til ovenstående:

_____

_____

_____

Appendix 12: Interview guide 1-3, case study 2

Interview-guide 1 – uge 45

Opgaven

Hvad går din opgave ud på hvis jeg spørger dig i dag
Hvordan foregik emnevalget
Prøv at beskriv hvordan du bedst arbejder
Hvad oplever du som tilfredsstillende
Er der noget du er specielt optaget af i øjeblikket
Er der noget der er særlig svært i øjeblikket
(Hvor meget minder det her om en diskussion I har haft i gruppen)

Gruppen

Prøv at fortæl om en eller flere situationer hvor du har oplevet gruppearbejde mest svært (givtigt)

Prøv at beskriv hvad der skete på jeres sidste møde i gruppen

Hvad er grunden til at du er i den gruppe
Har det nogen betydning, at du kender de andre i forvejen
Organisering af gruppen, foregår alle aktiviteter i fælleskab
Reaktioner på input fra andre gruppemedlemmers input – mundtlig el. skriftligt
Hvordan foregår kommunikationen i gruppen – hvad betyder det at mødes

Informationssøgning

Prøv at beskriv hvad du søger efter, hvorfor (mål med inf.søgning)
Hvordan søger du efter information i øjeblikket
Hvordan oplever du relevansen af dine søgeresultater – hvordan relevansvurderer du (afhængig af kilde)
Hvad gør du med resultatet/informationen/kilden (bestiller, videregiver til andre, læser, skriver noter)
Indgår information i jeres diskussioner i gruppen, hvordan

Vejlederen

Hvad bruger du din vejleder til
Hvordan oplever du vejlederens rolle
Hvilken betydning har det for opgaven, gruppen

Følelser

Prøv at fortæl hvordan du har det med projektet i øjeblikket
Er der noget der bekymrer dig ift. projektet
Hvordan påvirker det...

Brug af processkema og dagbog

Hvordan fungerer det at udfylde processkemaet, hvor lang tid ca.
Hvordan bruger du dagbogen

Check evt. brug af skemaer med informant

Spørgeteknikker
Hvad tænker du, mener du, føler du, oplever du...
Hvilke følelser frembringer det
Fortæl mig om din/dit...
Har det haft nogen indflydelse på... nogen betydning for...
Hvordan påvirker det dig...
Hvad var årsagen til at...
Har det nogle implikationer for dit nuværende gruppearbejde
Hvor meget minder det her om ... en diskussion I har haft i gruppen
Hvordan har du det med...
Hvordan hjalp det

Interview-guide 2 – uge 49

Opgaven

Hvad går din opgave ud på hvis jeg spørger dig i dag
Hvordan påvirker det dig at du skal aflevere en anden opgave (og ifht dette projekt)
Hvor i projektforløbet vil du mene I er
Hvad er status
Hvad er det næste I skal i gang med
Oplever du at I har travlt

Gruppen

Prøv at beskriv hvad der skete på jeres sidste møde i gruppen
Hvad gør du specifikt i gruppen pt (rolle) – hvordan oplever du din rolle
Hvordan har I organiseret gruppearbejdet pt
Foregår alle aktiviteter i fælleskab (eller med en eller flere)
Hvordan har du det med input fra andre gruppemedlemmer pt – mundtlig el. skriftligt
Hvordan foregår kommunikationen i gruppen – betydning at I mødes
Hvad er din oplevelse af situationen i gruppen

Informationssøgning

Hvordan vil du beskrive din informationssøgning i øjeblikket
Hvordan opleves informationssøgning i øjeblikket (hvordan har du det normalt med at søge)
Har du de informationer du skal bruge nu til resten af opgaven (informationsmæt)
Hvor søger du information
Prøv at beskriv hvad du søger efter, hvorfor (mål med inf.søgning)
Hvordan oplever du relevansen af dine søgeresultater – hvordan relevansvurderer du (afhængig af kilde, erfaring med kilde fra tidligere)
Hvad gør du med resultatet/informationen/kilden (bestiller, videregiver til andre, læser, skriver noter)
Indgår information i jeres diskussioner i gruppen, hvordan

Vejlederen

Hvad bruger du din vejleder til i øjeblikket
Hvordan oplever du vejlederens rolle nu
Hvilken betydning har det for opgaven, gruppen

Følelser

Prøv at fortæl hvordan du har det med projektet i øjeblikket
Er der noget der bekymrer dig ift. projektet
Hvordan påvirker det...

Brug af processkema og dagbog

Hvordan fungerer det at udfylde processkemaet, hvor lang tid ca.

Hvordan bruger du dagbogen

Check evt. brug af skemaer med informant

Spørgeteknikker
Hvad tænker du, mener du, føler du, oplever du...
Hvilke følelser frembringer det
Fortæl mig om din/dit...
Har det haft nogen indflydelse på... nogen betydning for...
Hvordan påvirker det dig...
Hvad var årsagen til at...
Har det nogle implikationer for dit nuværende gruppearbejde
Hvor meget minder det her om ... tidligere situation fx en diskussion I har haft i gruppen
Hvordan har du det med...
Hvordan hjalp det

Hvordan minder det her om en diskussion I har haft i gruppen

Hvorfor ...

Interview-guide 3 – uge 1 - 2005

Opgaven

Hvad vil du sige din opgave gik ud på, hvis jeg spørger dig i dag
Er der noget du gerne ville arbejde videre på i opgaven, hvis du fik en uge mere
Ville du foretrække at gøre det alene eller fortsætte med gruppen
Hvordan vil du beskrive fasen op mod aflevering (projektforløb)
Hvordan har din motivation været for at arbejde med opgaven – ændret sig
Har noget været let i projektperioden
Har noget været svært i projektperioden (fremhæve visse perioder)

Gruppen

Prøv at beskriv hvad der skete på jeres sidste møde i gruppen
Hvad var din rolle
Hvordan havde I organiseret gruppearbejdet til sidst
Foregik alle aktiviteter i fælleskab til sidst (eller med en eller flere)
Hvordan foregik kommunikationen i gruppen
Hvordan vil du beskrive situationen i gruppen op til deadline
Vil du arbejde med gruppen igen

Informationssøgning

Hvordan vil du beskrive din informationssøgning op til deadline
Prøv at beskriv hvad du søgte efter til sidst (mål med inf.søgning)
Hvordan oplevede du relevansen af dine søgeresultater til sidst
Føler du at du fik nok information til opgaven
Hvordan bestemmer du om har fået nok information til en opgave
Har de andre gruppemedlemmer haft indflydelse på dine valg og brug af information i projektperioden - hvordan (mediatorrollen)
Hvordan indgik information i jeres diskussioner i gruppen til sidst

Vejlederen

Hvad brugte du din vejleder til op mod deadline (hvilken rolle havde han)
Havde det nogen indflydelse på opgaven - hvilken

Følelser

Prøv at fortæl, hvordan du havde det med projektet op til aflevering
Har du på noget tidspunkt i projektforløbet følt ængstelse eller usikkerhed

Deltagelse i undersøgelsen, brug af processkema og dagbog

Hvad synes du om at deltage i undersøgelsen
Har det haft indflydelse på dit arbejde med opgaven
Har det haft indflydelse på gruppearbejdet
Hvad synes du om at blive P-testet
Var der noget der overraskede dig
Indgik testresultatet i jeres snak i gruppen
Hvordan fungerede det at udfylde processkemaet (+ dagbogen), hvor lang tid ca.
Har du nogle kommentarer til undersøgelsen og ellers

Check evt. brug af skemaer med informant

Spørgeteknikker
Hvad tænker du, mener du, føler du, oplever du...
Hvilke følelser frembringer det
Fortæl mig om din/dit...
Har det haft nogen indflydelse på...nogen betydning for...
Hvordan påvirker det dig...
Hvad var årsagen til at...
Har det nogle implikationer for dit nuværende gruppearbejde
Hvor meget minder det her om ...tidligere situation fx en diskussion I har haft i gruppen
Hvordan har du det med...
Hvordan hjalp det

Hvordan minder det her om en diskussion I har haft i gruppen

Hvorfor ...

Appendix 13: Interview plan, case study 2

København 18. oktober 2004

TIDSPLAN FOR INTERVIEWS

Nedenfor en plan for hvornår de enkelte interviews foregår. Hvis tidspunktet ikke skulle passe dig, kan du prøve at bytte inden for gruppen eller på tværs. Jeg skal blot vide besked om resultatet.

Interviewene tager bla. udgangspunkt i proces-papiret og din 'dagbog' og har til formål at belyse forhold omkring opgaveskrivning, informationssøgning og gruppeprocesser.

Interviewene varer ca. 45 min. og **foregår i C. 5.13** (JH's kontor)

Danmarks Biblioteksskole

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CVR-nr. DK 62 63 17 16

Interview 1 (2004)

Tidspunkt	2. november	3. november	5. november
9 –10	A1		
10-11	C1	B1	C4
11-12	B3		C3
13-14		B2	
14-15			
15-16	A2		C2
16-17	A3		

Interview 2 (2004)

Tidspunkt	1. december	2. december	3. december
9 –10			
10-11		B1	C4
11-12	A2	B3	C3
13-14	A3	B2	C1
14-15	A1		
15-16			C2
16-17			

Interview 3 (2005)

Tidspunkt	5. januar	6. januar	7. januar
9 –10			
10-11		B1	C4
11-12		B3	C3
13-14	A2	B2	C1
14-15	A3		
15-16	A1		C2
16-17			

ROYAL SCHOOL
OF LIBRARY
AND INFORMATION
SCIENCE

Appendix 14: Supervisor feedback, case study 2

Vurdering af fokus i de studerendes projektopgaver

Anfør med et tal fra 1 (svagt) - 5 (stærkt) din vurdering af fokus i de studerendes opgaver:

Deltager	Lærer	Fokus
A1	L1	
A2	L1	
A3	L1	
B1	L1	
B2	L1	
B3	L1	
C1	L2	
C2	L2	
C3	L2	
C4	L2	

L1=Lærer 1
L2=Lærer 2

Casestudie 2, 2004/2005 ved Jette Hyldegård

Appendix 15: Participant profiles (demographic survey), case study 2

GROUP A

	A1	A2	A3
PERSONAL[1]			
2. Age	48	31	30
3. Other education	Assistentudd. I postvæsenet (mellemlederudd)	Pædagoguddannelse	Københavns Universitet, lærerseminaret, Danmarks Journalisthøjskole (ikke færdiggjort)
GROUP WORK			
4. Worked in groups before	Yes	Yes	Yes
5. Worked alone before	Yes	Yes	Yes
6. Knowledge of the other group members	Know two (=know all)	Know all	Know all
6a. From earlier group work	Yes	Yes	yes
PROJECT ASSIGNMENT			
7. Domain knowledge (subject) before start	Some	Some	Some
INFORMATION SEEKING			
8. Search engine experience	Some	Some	Some
9. Database experience	Some	Some	Some
10. Finds what I'm looking for	Often	Often	Often
11. I often get impatient if I don't find what I'm looking for	Disagreeing	Agreeing a little	Agreeing some
12. I prefer documents confirming my thoughts and ideas	Agreeing some	Agreeing some	Disagreeing
13. I prefer documents creating new thoughts and ideas	Agreeing	Agreeing some	Agreeing
14. I sometimes run into documents that I have not searched for on conscious	Agreeing some	Strongly agreeing	Agreeing
15. I often find documents by talking with or asking other people	Agreeing a little	Agreeing	Agreeing some
16. Few, well chosen documents are enough to write an assignment	Agreeing a little	Agreeing some	Agreeing some
17. Sometimes I do not have time for searching documents	Agreeing a little	Agreeing a little	Agreeing a little
18. I prefer documents that are easy to access	Agreeing a litlle	Agreeing a litlle	Disagreeing
19. Articles, published in journals, are reliable	Agreeing some	Agreeing some	Agreeing a little
20. What is published in books are facts that you can trust	Agreeing some	Agreeing some	Disagreeing
21. I normally agree when someone argues for something	Agreeing a little	Agreeing some	Agreeing a little
22. information retrieval is a time consuming element of project work	Agreeing	Strongly agreeing	Agreeing some
23. I gladly wait two weeks for an inter urban loan	Agreeing some	Agreeing	agreeing

[1] Number 1 in the demographic inquiry refers to the name of the participant and but has been left out here in respect of the participants´ anonymity

GROUP B

	B1	B2	B3
PERSONAL			
2. Age	25	29	23
3. Other education	Organist	Ergoterapeut	%
GROUP WORK			
4. Worked in groups before	Yes	Yes	Yes
5. Worked alone before	No	Yes	No
6. Knowledge of the other group members	Know all	Know all	Know all
6a. From earlier group work	No	No	No
PROJECT ASSIGNMENT			
7. Domain knowledge (subject) before start	Some	A little	Some
INFORMATION SEEKING			
8. Search engine experience	Some	Some	Wide
9. Database experience	Some	Wide	Wide
10. Finds what I'm looking for	Often	Often	allways
11. I often get impatient if I don't find what I'm looking for	Agreeing a little	Agreeing some	Disagreeing
12. I prefer documents confirming my thoughts and ideas	Agreeing some	Agreeing a little	Disagreeing
13. I prefer documents creating new thoughts and ideas	Agreeing	Agreeing	Agreeing
14. I sometimes run into documents that I have not searched for on conscious	Agreeing	Agreeing	Strongly agreeing
15. I often find documents by talking with or asking other people	Agreeing a little	Agreeing some	Agreeing
16. Few, well chosen documents are enough to write an assignment	Agreeing a little	Agreeing	Agreeing some
17. Sometimes I do not have time for searching documents	Agreeing	Disagreeing	Disagree
18. I prefer documents that are easy to access	Agreeing some	Agreeing some	Agreeing a little
19. Articles, published in journals, are reliable	Agreeing	Agreeing some	Agreeing a litlle
20. What is published in books are facts that you can trust	Agreeing some	Agreeing a litlle	Agreeing a little
21. I normally agree when someone argues for something	Agreeing some	Agreeing a little	Agreeing
22. information retrieval is a time consuming element of project work	Strongly agreeing	Strongly agreeing	Strongly agreeing
23. I gladly wait two weeks for an inter urban loan	Strongly agreeing	Agreeing	Strongly agreeing

GROUP C

	C1	C2	C3	C4
PERSONAL				
2. Age	24	25	28	27
3. Other education	%	%	Engelsk på KU (halv udd.)	Folkesundhedsvidenskab på KU og Økonomi på KU (begge afbrudt)
GROUP WORK				
4. Worked in groups before	Yes	Yes	Yes	Yes
5. Worked alone before	No	Yes	No	yes
6. Knowledge of the other group members	Know 3 (=all)	Know all	Know 3 (=all)	Know all
6a. From earlier group work	Yes	Yes	No	Yes
PROJECT ASSIGNMENT				
7. Domain knowledge (subject) before start	Some	Some	A little	A little
INFORMATION SEEKING				
8. Search engine experience	Some	Wide	Wide	Wide
9. Database experience	Wide	Some	Some	Some
10. Finds what I'm looking for	Often	Often	Often	Often
11. I often get impatient if I don't find what I'm looking for	Agreeing some	Agreeing some	Agreeing some	Agreeing a little
12. I prefer documents confirming my thoughts and ideas	Disagreeing	Agreeing a little	Disagreeing	Agreeing some
13. I prefer documents creating new thoughts and ideas	Strongly agreeing	Strongly agreeing	Agreeing	Agreeing some
14. I sometimes run into documents that I have not searched for on conscious	Strongly agreeing	Agreeing	Agreeing	Agreeing a little
15. I often find documents by talking with or asking other people	Strongly agreeing	Agreeing	Agreeing a little	Agreeing a little
16. Few, well chosen documents are enough to write an assignment	Agreeing some	Agreeing a little	Disagreeing	Agreeing some
17. Sometimes I do not have time for searching documents	Disagreeing	Agreeing a little	Disagreeing	Disagreeing
18. I prefer documents that are easy to access	Disagreeing	Agreeing a little	Disagreeing	Disagreeing
19. Articles, published in journals, are reliable	Agreeing	Agreeing some	Agreeing some	Agreeing some
20. What is published in books are facts that you can trust	Agreeing	Agreeing a little	Agreeing some	Agreeing some
21. I normally agree when someone argues for something	Agreeing some	Agreeing a little	Disagreeing	Agreeing a little
22. information retrieval is a time consuming element of project work	Agreeing	Strongly agreeing	Strongly agreeing	Agreeing
23. I gladly wait two weeks for an inter urban loan	Agreeing	Agreeing	Strongly agreeing	Agreeing some

Appendix 16: Personality test – scoring, case study 2

Appendix 16 shows the 10 group members' scoring on facets according to the personality scoring scheme running from 'very low' (-34) to 'very high'(66-).

	Very low	**Low**	**Middle**	**High**	**Very high**
T scores	**- 34**	**35 – 44**	**45 - 55**	**56 - 65**	**66 –**
Neuroticism (N)					
Anxiety		B3, C4	A2, B1, C1, C2, C3	A1, A3, B2	
Temper	B3		A1, B1, C2, C3, C4	A2, A3, B2	C1
Pessimism	B3	A1, C2	C3, C4	A2, A3, B1, C1,	B2
Social anxiety		A1, C2	A3, B3, C3, C4	A2, B2, C1	B1
Impulsiveness			A1, A3, B2, B3	A2, B1, C1, C4	C2, C3
Uncertainy/nervous		C4	A1, B3, C1, C2, C3	A2, B1	A3, B2
Exstraversion (E)					
Warm		C1	A1, A2, A3, C2, C3	B1, B2, C4	B3
Social (selskab)		A1, A2, C1	A3, B1, B3, C2	B2, C3, C4	
Dominating			A1, A2, A3, B1, C2	B2, C3, C4	C1
Level of activity		A2, A3, B1, B2, C1, C2	A1, B2	C3, C4	
Seeking exitement		A1	C1, C4	A2, A3, B1, B2, B3, C2, C3	
Positive emotions			A2, A3, B1, C1	A1, B2, C2, C3, C4	B3
T scores	**- 34**	**35 – 44**	**45 - 55**	**56 - 65**	**66 –**
Openess to experience (O)					
Imaginative			A1	A2, B1, B2, C3, C4	A3, B3, C1, C2
Aesthetic		A1, C3	A2, B2	A3, B1, C1, C4	B3, C2
Emotional deep		B1	C2, C4	A1, A2, A3, C1	B2, B3, C3
Experimental		A1	A2, A3, B2, B3, C1	B1, C2, C3, C4	
Intellectual curious		C3	B2, B3, C4	A2, A3, B1,	A1, C1

				C2	
Tolerance			A3, B3	A1, A2, B2, C1, C2, C4	B1, C3
	Very low	**Low**	**Middle**	**High**	**Very high**
T scores	**- 34**	**35 – 44**	**45 - 55**	**56 - 65**	**66 –**
Agreeableness (A)					
Trustful		A3, C1, C3	A1, A2, B1, B2	C2, C4	B3
Sincerity	A2, A3, B2	A1, C3	C1, C4	B1, C2	B3
Charity		A1, A3, B2, C3	A2, B1, C1	C2, C4	B3
Indulgence	C3	A3, B2, C4	A1, A2, C1, C2	B1, B3	
Modesty	A3	A1, C3	A2, C1, C2, C4		
Sympathy			A1, A2, A3, B1, B2, C1, C2, C3	B3, C4	
Conscientiousness (C)					
Feeling of competence		B1	A2, A3, C1, C4	A1, B2, B3, C2, C3	
Orderliness	A2, B1, C4	C2	A1, C3	A3, B2, B3, C1	
Feeling of responsibility	B1	B2, C1, C4	A1, A2, A3, C2, C3		B3
Performance focus			A1, A2, A3, B1, B2, B3, C1, C3, C4	C2	
Self-discipline	B1	C1, C3, C4	A2, A3, B2, C2	A1, B3	
Steadiness (besindig)	B2, C2	A3, C3	A1, A2, B1, C1, C4	B3	

Appendix 17: Group A, B and C scoring on personality facets, case study 2

Appendix 17 shows the group member scorings on personality facets across each group, that is:

Group A: A1, A2, A3
Group B: B1, B2, B3
Group C: C1, C2, C3, C4

Group A

Personality dimension	**T score: A1**	**T score: A2**	**T score: A3**
Neuroticism	**47**	**60**	**63**
Anxiety	57	51	63
Temper	48	60	60
Pessimism	42	56	65
Social anxiety	39	61	52
Impulsiveness	46	58	55
Uncertainy/nervous	50	58	66
Extraversion	**46**	**48**	**50**
Warm	46	52	52
Social (selskab)	39	41	48
Dominating	55	51	53
Level of activity	46	39	35
Seeking exitement	39	58	61
Positive emotions	62	51	48
Openess to experience	**53**	**61**	**64**
Imaginative	53	59	67
Aesthetic	37	52	57
Emotional deep	61	64	64
Experimental	43	53	55
Intellectual curious	66	58	63
Tolerance	56	62	49
Agreeableness	**40**	**43**	**30**
Trustful	50	47	37
Sincerity	37	33	33
Charity	42	53	42
Indulgence	52	54	38

Modesty	42	46	33
Sympathy	46	48	55
Conscientiousness	**52**	**45**	**47**
Feeling of competence	58	48	51
Orderliness	48	29	60
Feeling of responsibility	46	49	46
Performance focus	49	49	47
Self-discipline	64	55	45
Steadiness (besindig)	46	50	40

Group B

Personality dimension	**T score: B1**	**T score: B2**	**T score: B3**
Neuroticism	**60**	**65**	**40**
Anxiety	54	59	41
Temper	45	63	34
Pessimism	58	69	32
Social anxiety	67	59	49
Impulsiveness	58	49	49
Uncertainy/nervous	63	66	52
Extraversion	**47**	**64**	**65**
Warm	58	61	66
Social (selskab)	46	63	75
Dominating	45	64	55
Level of activity	37	51	44
Seeking exitement	56	59	58
Positive emotions	45	60	73
Openess to experience	**63**	**58**	**62**
Imaginative	63	57	69
Aesthetic	57	50	67
Emotional deep	44	76	66
Experimental	57	50	53
Intellectual curious	60	51	45
Tolerance	68	59	49

Agreeableness	**57**	**38**	**74**
Trustful	54	47	74
Sincerity	59	33	72
Charity	53	49	78
Indulgence	59	38	56
Modesty	46	42	55
Sympathy	52	52	58
Conscientiousness	**33**	**50**	**67**
Feeling of competence	43	61	64
Orderliness	26	57	60
Feeling of responsibility	31	43	72
Performance focus	45	49	51
Self-discipline	33	55	61
Steadiness (besindig)	52	33	64

Group C

Personality dimension	**T score: C1**	**T score: C2**	**T score: C3**	**T score: C4**
Neuroticism	**59**	**50**	**56**	**46**
Anxiety	49	51	53	41
Temper	70	52	55	49
Pessimism	56	39	54	47
Social anxiety	56	44	49	46
Impulsiveness	61	69	66	56
Uncertainy/nervous	55	47	55	42
Extraversion	**50**	**53**	**64**	**64**
Warm	41	55	52	62
Social (selskab)	39	52	60	64
Dominating	67	51	60	61
Level of activity	44	41	56	60
Seeking exitement	53	56	65	51
Positive emotions	51	57	62	58

Openess to experience	**67**	**70**	**57**	**60**
Imaginative	67	72	60	50
Aesthetic	64	74	42	65
Emotional deep	61	55	66	55
Experimental	55	63	65	61
Intellectual curious	66	57	41	52
Tolerance	59	62	72	60
Agreeableness	**45**	**58**	**35**	**52**
Trustful	41	61	43	57
Sincerity	51	64	42	49
Charity	45	65	42	57
Indulgence	46	46	33	40
Modesty	48	46	40	51
Sympathy	48	48	48	56
Conscientiousness	**47**	**48**	**46**	**42**
Feeling of competence	55	58	61	48
Orderliness	57	42	45	34
Feeling of responsibility	36	52	49	40
Performance focus	49	56	49	49
Self-discipline	43	52	43	44
Steadiness (besindig)	50	31	40	48

Appendix 18: Primary Doc-families, case study 2

HU: IndiGroup-PhdProject
File: [H:\PHD\Atlas.ti-analyse\IndiGroup-PhdProject.hpr5]
Edited by: Super
Date/Time: 02-03-06 14:58:28

Primary Doc Family: **A1-dbg**
Created: 10-02-05 13:18:50 (Super)
Primary Docs (3): [P 1: Dagbog1A1.rtf] [P11: Dagbog2A1.rtf] [P21: Dagbog3A1.rtf]
Quotation(s): 25

Primary Doc Family: **A1-Intview**
Created: 17-06-05 12:41:46 (Super)
Primary Docs (3): [P38: interview1A-A1.rtf] [P48: Interview2B-A1.rtf] [P58: Interview3C-A1.rtf]
Quotation(s): 85

Primary Doc Family: **A2-dbg**
Created: 10-02-05 13:18:57 (Super)
Primary Docs (3): [P 2: Dagbog1A2.rtf] [P12: Dagbog2A2.rtf] [P22: Dagbog3A2.rtf]
Quotation(s): 30

Primary Doc Family: **A2-Intview**
Created: 17-06-05 12:41:11 (Super)
Primary Docs (3): [P32: Interview1A-A2.rtf] [P42: Interview2B-A2.rtf] [P52: Interview3C-A2.rtf]
Quotation(s): 88

Primary Doc Family: **A3-dbg**
Created: 10-02-05 13:19:04 (Super)
Primary Docs (3): [P 3: Dagbog1A3.rtf] [P13: Dagbog2A3.rtf] [P23: Dagbog3A3.rtf]
Quotation(s): 29

Primary Doc Family: **A3-Intview**
Created: 17-06-05 12:41:59 (Super)
Primary Docs (3): [P33: Interview1A-A3.rtf] [P43: Interview2B-A3.rtf] [P53: Interview3C-A3.rtf]
Quotation(s): 92

Primary Doc Family: **GruppeA**
Created: 15-06-06 14:43:32 (Super)
Primary Docs (18): [P 1: Dagbog1A1.rtf] [P 2: Dagbog1A2.rtf] [P 3: Dagbog1A3.rtf] [P11: Dagbog2A1.rtf] [P12: Dagbog2A2.rtf] [P13: Dagbog2A3.rtf] [P21: Dagbog3A1.rtf] [P22: Dagbog3A2.rtf] [P23: Dagbog3A3.rtf] [P32: Interview1A-A2.rtf] [P33: Interview1A-A3.rtf] [P38: interview1A-A1.rtf] [P42: Interview2B-A2.rtf] [P43: Interview2B-A3.rtf] [P48: Interview2B-A1.rtf] [P52: Interview3C-A2.rtf] [P53: Interview3C-A3.rtf] [P58: Interview3C-A1.rtf]
Quotation(s): 349

Primary Doc Family: **B1-dbg**
Created: 10-02-05 13:19:15 (Super)
Primary Docs (3): [P 4: Dagbog1B1.rtf] [P14: Dagbog2B1.rtf] [P24: Dagbog3B1.rtf]

Quotation(s): 18

Primary Doc Family: **B1-Intview**
Created: 17-06-05 12:42:11 (Super)
Primary Docs (3): [P35: Interview1A-B1.rtf] [P45: Interview2B-B1.rtf] [P55: Interview3C-B1.rtf]
Quotation(s): 85

Primary Doc Family: **B2-dbg**
Created: 10-02-05 13:19:27 (Super)
Primary Docs (3): [P 5: Dagbog1B2.rtf] [P15: Dagbog2B2.rtf] [P25: Dagbog3B2.rtf]
Quotation(s): 23

Primary Doc Family: **B2-Intview**
Created: 17-06-05 12:43:21 (Super)
Primary Docs (3): [P40: Interview1A-B2.rtf] [P50: Interview2B-B2.rtf] [P60: Interview3C-B2.rtf]
Quotation(s): 86

Primary Doc Family: **B3-dbg**
Created: 10-02-05 13:19:33 (Super)
Primary Docs (3): [P 6: Dagbog1B3.rtf] [P16: Dagbog2B3.rtf] [P26: Dagbog3B3.rtf]
Quotation(s): 21

Primary Doc Family: **B3-Intview**
Created: 17-06-05 12:42:22 (Super)
Primary Docs (3): [P39: Interview1A-B3.rtf] [P49: Interview2B-B3.rtf] [P59: Interview3C-B3.rtf]
Quotation(s): 100

Primary Doc Family: **GruppeB**
Created: 15-06-06 14:47:42 (Super)
Primary Docs (18): [P 4: Dagbog1B1.rtf] [P 5: Dagbog1B2.rtf] [P 6: Dagbog1B3.rtf] [P14: Dagbog2B1.rtf] [P15: Dagbog2B2.rtf] [P16: Dagbog2B3.rtf] [P24: Dagbog3B1.rtf] [P25: Dagbog3B2.rtf] [P26: Dagbog3B3.rtf] [P35: Interview1A-B1.rtf] [P39: Interview1A-B3.rtf] [P40: Interview1A-B2.rtf] [P45: Interview2B-B1.rtf] [P49: Interview2B-B3.rtf] [P50: Interview2B-B2.rtf] [P55: Interview3C-B1.rtf] [P59: Interview3C-B3.rtf] [P60: Interview3C-B2.rtf]
Quotation(s): 333

Primary Doc Family: **C1-Dbg**
Created: 10-02-05 13:19:38 (Super)
Primary Docs (3): [P 7: Dagbog1C1.rtf] [P17: Dagbog2C1.rtf] [P27: Dagbog3C1.rtf]
Quotation(s): 27

Primary Doc Family: **C1-Intview**
Created: 17-06-05 12:41:23 (Super)
Primary Docs (3): [P31: Interview1A-C1.rtf] [P41: Interview2B-C1.rtf] [P51: Interview3C-C1.rtf]
Quotation(s): 92

Primary Doc Family: **C2-dbg**
Created: 10-02-05 13:19:53 (Super)
Primary Docs (3): [P 8: Dagbog1C2.rtf] [P18: Dagbog2C2.rtf] [P28: Dagbog3C2.rtf]
Quotation(s): 17

Primary Doc Family: **C2-Intview**
Created: 17-06-05 12:42:34 (Super)
Primary Docs (3): [P36: Interview1A-C2.rtf] [P46: Interview2B-C2.rtf] [P56: Interview3C-C2.rtf]
Quotation(s): 87

Primary Doc Family: **C3-dbg**
Created: 10-02-05 13:20:06 (Super)
Primary Docs (3): [P 9: Dagbog1C3.rtf] [P19: Dagbog2C3.rtf] [P29: Dagbog3C3.rtf]
Quotation(s): 31

Primary Doc Family: **C3-Intview**
Created: 17-06-05 12:42:46 (Super)
Primary Docs (3): [P37: Interview1A-C3.rtf] [P47: Interview2B-C3.rtf] [P57: Interview3C-C3.rtf]
Quotation(s): 92

Primary Doc Family: **C4-dbg**
Created: 10-02-05 13:20:46 (Super)
Primary Docs (3): [P10: Dagbog1C4.rtf] [P20: Dagbog2C4.rtf] [P30: Dagbog3C4.rtf]
Quotation(s): 33

Primary Doc Family: **C4-Intview**
Created: 17-06-05 12:42:58 (Super)
Primary Docs (3): [P34: Interview1A-C4.rtf] [P44: Interview2B-C4.rtf] [P54: Interview3C-C4.rtf]
Quotation(s): 78

Primary Doc Family: **GruppeC**
Created: 15-06-06 14:48:51 (Super)
Primary Docs (24): [P 7: Dagbog1C1.rtf] [P 8: Dagbog1C2.rtf] [P 9: Dagbog1C3.rtf] [P10: Dagbog1C4.rtf] [P17: Dagbog2C1.rtf] [P18: Dagbog2C2.rtf] [P19: Dagbog2C3.rtf] [P20: Dagbog2C4.rtf] [P27: Dagbog3C1.rtf] [P28: Dagbog3C2.rtf] [P29: Dagbog3C3.rtf] [P30: Dagbog3C4.rtf] [P31: Interview1A-C1.rtf] [P34: Interview1A-C4.rtf] [P36: Interview1A-C2.rtf] [P37: Interview1A-C3.rtf] [P41: Interview2B-C1.rtf] [P44: Interview2B-C4.rtf] [P46: Interview2B-C2.rtf] [P47: Interview2B-C3.rtf] [P51: Interview3C-C1.rtf] [P54: Interview3C-C4.rtf] [P56: Interview3C-C2.rtf] [P57: Interview3C-C3.rtf]
Quotation(s): 457

Primary Doc Family: **Dagbog1**
Created: 10-02-05 13:21:00 (Super)
Primary Docs (10): [P 1: Dagbog1A1.rtf] [P 2: Dagbog1A2.rtf] [P 3: Dagbog1A3.rtf] [P 4: Dagbog1B1.rtf] [P 5: Dagbog1B2.rtf] [P 6: Dagbog1B3.rtf] [P 7: Dagbog1C1.rtf] [P 8: Dagbog1C2.rtf] [P 9: Dagbog1C3.rtf] [P10: Dagbog1C4.rtf]
Quotation(s): 94

Primary Doc Family: **Dagbog2**
Created: 10-02-05 13:21:05 (Super)
Primary Docs (10): [P11: Dagbog2A1.rtf] [P12: Dagbog2A2.rtf] [P13: Dagbog2A3.rtf] [P14: Dagbog2B1.rtf] [P15: Dagbog2B2.rtf] [P16: Dagbog2B3.rtf] [P17: Dagbog2C1.rtf] [P18: Dagbog2C2.rtf] [P19: Dagbog2C3.rtf] [P20: Dagbog2C4.rtf]
Quotation(s): 49

Appendix 19: Coding list, case study 2

HU: IndiGroup-PhdProject
File: [H:\PHD\Atlas.ti-analyse\IndiGroup-PhdProject.hpr5]
Edited by: Super
Date/Time: 23-02-06 11:02:30

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2. projekt
ad-hoc møde
afklaring, emne
afklaring, gruppen
afklaring, individuel
afklaring, opgaven
afklaring, søgning
analyseafsnit
arbejdsform
arbejdsplan
artikler
baggrundsmateriale
bestiller materiale online
bøger
chekker formalia
chekker litteratur
databaser
delafsnit, andres
disposition
ekstern opac
eksternt bibliotek
emailer
emnevalg
feedback, kritik
focus-formulering, start
fokus-formulering
fokus-formulering, individuel
fokus-formulering, litteratur
fokus-formulering, midt
fokus-formulering, slut
forberede skrivning
forberede vejledning
forståelse, fælles
fortrøsningsfuld, litteratur
fortrøstningsfuld
fortrøstningsfuld, gruppe
fortrøstningsfuld, opgave
forventningsfuld, opgave
frustreret, gruppe
frustreret, informationssøgning
frustreret, litteratur
frustreret, opgave
fællesvejledning
følelser, midt
følelser, slut
følelser, start
genlæser litteratur
gennemgår manus
gennemgår manus (gruppe)
gennemgår materiale
Google
gruppe-kvalitet
gruppeansvar
gruppekendskab
gruppemedlemmer, andre
gruppemedlemmer, bidrag
gruppemedlemmer, engagement
gruppemedlemmer, litteratur
gruppemedlemmer, roller
gruppemedlemmer, viden
gruppemøde
gruppemøde, form
gruppemøde, midt
gruppemøde, slut
gruppeprocessen
gruppevalg
henter materiale
hjemmesider
indgår aftaler
individ-kvalitet
information, adgang
information, gruppemøder
informationsbehov, individuel
informationskilder
informationssøgning
informationssøgning, 'nok'
informationssøgning, gruppe
Informationssøgning, individuel
informationssøgning, komplekst
informationssøgning, mangler
informationssøgning, midt
informationssøgning, slut
informationssøgning, start
informationsøgning, fælles
interesse, emne
interesse, informationssøgning
interesse, opgave
internetsider
kommunikation, gruppe
kommunikation, informationssøgning
kommunikationsform
kommunikerer med gruppemedlem
kommunikerer med gruppemedlemmer
lettelse, opgave

Appendix 20: Code families and associated codes, case study 2

HU: IndiGroup-PhdProject
File: [H:\PHD\Atlas.ti-analyse\IndiGroup-PhdProject.hpr5]
Edited by: Super
Date/Time: 22-02-06 16:30:22

Code Family: **COGNITION-ALL**
Created: 16-08-05 16:16:30 (Super)
Codes (35): [afklaring, emne] [focus-formulering, start] [fokus-formulering] [fokus-formulering, individuel] [fokus-formulering, litteratur] [fokus-formulering, midt] [fokus-formulering, slut] [forståelse, fælles] [information, gruppemøder] [interesse, emne] [kommunikation, gruppe] [læser artikler] [læser baggrundslitteratur] [læser litteratur] [læser mails] [læser manus] [læser noter] [motiveret, emne] [personlighed] [skimmer artikler] [skimmer bøger] [skriveprocessen] [skriveprocessen, fælles] [skriver kommentarer] [skriver noter] [skriver på afsnit] [skriver på analyseafsnit] [skriver på indledning] [skriver på indledning (grupppe)] [skriver på metodeafsnit] [skriver på teoriafsnit] [uddelegering, litteratur] [udveksling, litteratur] [vejlederen, rolle] [vejledning]
Quotation(s): 394

Code Family: **FEELINGS**
Created: 15-08-05 13:11:58 (Super)
Codes (50): [afklaring, emne] [afklaring, gruppen] [afklaring, individuel] [afklaring, opgaven] [afklaring, søgning] [fortrøsningsfuld, litteratur] [fortrøstningsfuld] [fortrøstningsfuld, gruppe] [fortrøstningsfuld, opgave] [forventningsfuld, opgave] [frustreret, gruppe] [frustreret, informationssøgning] [frustreret, litteratur] [frustreret, opgave] [følelser, midt] [følelser, slut] [følelser, start] [interesse, emne] [interesse, informationssøgning] [interesse, opgave] [lettelse, opgave] [ligegyldighed, opgave] [motiveret, emne] [motiveret, gruppe] [motiveret, informationssøgning] [motiveret, opgave] [samvittighedsnag] [samvittighedsnag, gruppe] [samvittighedsnag, opgave] [semiopgavestemning] [skuffet, gruppe] [skuffet, opgave] [stresset, emne] [stresset, gruppe] [stresset, opgave] [tilfreds, gruppen] [tilfreds, informationssøgning] [tilfreds, opgaveprocessen] [tryg, emne] [tryg, gruppe] [tryg, litteratur] [tryg, opgave] [tvivl, opgave] [usikker] [usikker, emne] [usikker, gruppe] [usikker, individuelt ansvar] [usikker, informationssøgning] [usikker, opgave] [utilfreds, opgave]
Quotation(s): 178

Code Family: **NEGATIVE FEELINGS**
Created: 16-08-05 11:30:34 (Super)
Codes (21): [frustreret, gruppe] [frustreret, informationssøgning] [frustreret, litteratur] [frustreret, opgave] [ligegyldighed, opgave] [samvittighedsnag] [samvittighedsnag, gruppe] [samvittighedsnag, opgave] [skuffet, gruppe] [skuffet, opgave] [stresset, emne] [stresset, gruppe] [stresset, opgave] [tvivl, opgave] [usikker] [usikker, emne] [usikker, gruppe] [usikker, individuelt ansvar] [usikker, informationssøgning] [usikker, opgave] [utilfreds, opgave]
Quotation(s): 77

Code Family: **POSITIVE FEELINGS**
Created: 16-08-05 11:32:38 (Super)
Codes (26): [afklaring, emne] [afklaring, gruppen] [afklaring, individuel] [afklaring, opgaven] [afklaring, søgning] [fortrøsningsfuld, litteratur] [fortrøstningsfuld] [fortrøstningsfuld, gruppe] [fortrøstningsfuld, opgave] [forventningsfuld, opgave] [interesse, emne] [interesse, informationssøgning] [interesse, opgave] [lettelse, opgave] [motiveret, emne] [motiveret, gruppe] [motiveret, informationssøgning] [motiveret, opgave] [semiopgavestemning] [tilfreds, gruppen] [tilfreds, informationssøgning] [tilfreds, opgaveprocessen] [tryg, emne] [tryg, gruppe] [tryg, litteratur] [tryg, opgave]
Quotation(s): 105

Code Family: **FEELINGS, GROUP**
Created: 06-12-05 14:24:25 (Super)
Codes (9): [afklaring, gruppen] [afklaring, individuel] [fortrøstningsfuld, gruppe] [motiveret, gruppe] [samvittighedsnag, gruppe] [stresset, gruppe] [tilfreds, gruppen] [tryg, gruppe] [usikker, gruppe]
Quotation(s): 26

Code Family: **FEELINGS, INFORMATION SEEKING**
Created: 06-12-05 14:36:08 (Super)
Codes (9): [afklaring, søgning] [fortrøsningsfuld, litteratur] [frustreret, informationssøgning] [frustreret, litteratur] [interesse, informationssøgning] [motiveret, informationssøgning] [tilfreds, informationssøgning] [tryg, litteratur] [usikker, informationssøgning]
Quotation(s): 12

Code Family: **FEELINGS, WORK-TASK**
Created: 06-12-05 14:31:01 (Super)
Codes (22): [afklaring, emne] [afklaring, opgaven] [fortrøstningsfuld, opgave] [forventningsfuld, opgave] [frustreret, opgave] [interesse, emne] [interesse, opgave] [lettelse, opgave] [ligegyldighed, opgave] [motiveret, emne] [motiveret, opgave] [samvittighedsnag, opgave] [semiopgavestemning] [skuffet, opgave] [stresset, emne] [stresset, opgave] [tilfreds, opgaveprocessen] [tryg, emne] [tvivl, opgave] [usikker, emne] [usikker, opgave] [utilfreds, opgave]
Quotation(s): 123

Code Family: **GROUP WORK**
Created: 15-08-05 23:09:02 (Super)
Codes (41): [afklaring, gruppen] [emailer] [feedback, kritik] [fortrøstningsfuld, gruppe] [frustreret, gruppe] [gruppe-kvalitet] [gruppeansvar] [gruppekendskab] [gruppemedlemmer, andre] [gruppemedlemmer, bidrag] [gruppemedlemmer, engagement] [gruppemedlemmer, litteratur] [gruppemedlemmer, roller] [gruppemedlemmer, viden] [gruppemøde] [gruppemøde, form] [gruppemøde, midt] [gruppemøde, slut] [gruppeprocessen] [gruppevalg] [indgår aftaler] [individ-kvalitet] [information, gruppemøder] [kommunikation, gruppe] [kommunikation, informationssøgning] [kommunikationsform] [kommunikerer med gruppemedlem] [kommunikerer med gruppemedlemmer] [Messenger] [mindmapping, gruppe] [motiveret, gruppe] [organisering af gruppearbejde] [problemer, gruppe] [samvittighedsnag, gruppe] [skuffet, gruppe] [SMS] [stresset, gruppe] [summemøde] [telefon] [tryg, gruppe] [usikker, gruppe]
Quotation(s): 361

Code Family: **GROUP WORK, COMMUNICATION**
Created: 16-08-05 11:16:33 (Super)
Codes (9): [emailer] [gruppemøde, form] [kommunikation, gruppe] [kommunikationsform] [kommunikerer med gruppemedlem] [kommunikerer med gruppemedlemmer] [Messenger] [SMS] [telefon]
Quotation(s): 56

Code Family: **GROUP-MEETINGS**
Created: 06-12-05 15:09:09 (Super)
Codes (6): [gruppemøde] [gruppemøde, form] [gruppemøde, midt] [gruppemøde, slut] [information, gruppemøder] [summemøde]
Quotation(s): 92

Code Family: **INDIVIDUAL**
Created: 16-08-05 14:54:35 (Super)
Codes (11): [afklaring, individuel] [arbejdsform] [fokus-formulering, individuel] [individ-kvalitet] [informationsbehov, individuel] [Informationssøgning, individuel] [opgave, individuelt ansvar] [opgave, individuelt produkt] [opgavestatus, individuel] [personlighed] [problemformulering, individuel]
Quotation(s): 147

Code Family: **INFORMATION SEEKING**
Created: 15-08-05 23:14:54 (Super)
Codes (58): [afklaring, søgning] [artikler] [baggrundsmateriale] [bestiller materiale online] [bøger] [chekker litteratur] [databaser] [ekstern opac] [eksternt bibliotek] [fortrøsningsfuld, litteratur] [frustreret, informationssøgning] [frustreret, litteratur] [genlæser litteratur] [gennemgår materiale] [Google] [gruppemedlemmer, litteratur] [gruppemedlemmer, viden] [henter materiale] [hjemmesider] [information, adgang] [information, gruppemøder] [informationsbehov, individuel] [informationskilder] [informationssøgning] [informationssøgning, 'nok'] [informationssøgning, gruppe] [Informationssøgning, individuel] [informationssøgning, komplekst] [informationssøgning, mangler] [informationssøgning, midt] [informationssøgning, slut] [informationssøgning, start] [informationsøgning, fælles] [interesse, informationssøgning] [internetsider] [kommunikation, informationssøgning] [litteraturgrundlag] [læser artikler] [læser baggrundslitteratur] [læser litteratur] [låner litteratur] [motiveret, informationssøgning] [relevansvurdering] [relevansvurdering, fælles] [relevansvurdering, midt] [relevansvurdering, start] [skimmer artikler] [skimmer bøger] [skimmer litteraturlister] [skimmer materiale] [skimmer søgeresultat] [tilfreds, informationssøgning] [tryg, litteratur] [TV-kiggeri] [uddelegering, litteratur] [udveksling, litteratur] [udveksling, søgeord] [usikker, informationssøgning]
Quotation(s): 233

Code Family: **INFORMATION SEEKING, SOURCES**
Created: 16-08-05 11:12:37 (Super)
Codes (12): [artikler] [baggrundsmateriale] [bøger] [databaser] [ekstern opac] [eksternt bibliotek] [Google] [hjemmesider] [informationskilder] [internetsider] [litteraturgrundlag] [TV-kiggeri]
Quotation(s): 33

Code Family: **INFORMATION SEEKING, STRATEGY**
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Codes (29): [chekker litteratur] [genlæser litteratur] [Google] [gruppemedlemmer, litteratur] [informationssøgning] [informationssøgning, 'nok'] [informationssøgning, gruppe] [Informationssøgning, individuel] [informationssøgning, komplekst] [informationssøgning, mangler] [informationssøgning, midt] [informationssøgning, slut] [informationssøgning, start] [informationsøgning, fælles] [internetsider] [litteraturgrundlag] [litteraturliste] [læser artikler] [læser baggrundslitteratur] [læser litteratur] [læser noter] [skimmer artikler] [skimmer bøger] [skimmer litteraturlister] [skimmer materiale] [skimmer søgeresultat] [uddelegering, litteratur] [udveksling, litteratur] [udveksling, søgeord]
Quotation(s): 166

Code Family: **INFORMATION SEEKING, RELEVANCE**
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Codes (4): [relevansvurdering] [relevansvurdering, fælles] [relevansvurdering, midt] [relevansvurdering, start]

Quotation(s): 28

Code Family: **WORK-TASK**
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Quotation(s): 570

Code Family: **WORK-TASK, PROCES**
Created: 06-12-05 16:45:35 (Super)
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Quotation(s): 259

Code Family: **WORK TASK, COUNCELLING**
Created: 06-12-05 16:53:22 (Super)
Codes (4): [forberede vejledning] [fællesvejledning] [vejlederen, rolle] [vejledning]
Quotation(s): 82

Code Family: **WORK TASK, PRODUCT**
Created: 06-12-05 16:09:45 (Super)
Codes (13): [analyseafsnit] [delafsnit, andres] [disposition] [metodeafsnit] [opgave, fælles produkt] [opgave, gruppestørrelse] [opgave, individuelt ansvar] [opgave, individuelt produkt] [opgave, omfang] [opgaveelementer] [opgaveelementer, fælles] [problemformulering] [problemformulering, individuel]
Quotation(s): 101

Code Family: **METHODOLOGY**
Created: 15-08-05 23:21:31 (Super)
Codes (11): [metode, baggrund for deltagelse] [metode, dagbøger] [metode, deltagelsen] [metode, interview] [metode, introduktionen] [metode, min rolle] [metode, P-test] [metode, praktisk] [metode, processkema] [metode, påvirkning] [metode, succeskriterier for deltagelse]
Quotation(s): 94

Appendix 21: Group member characteristics – group A

Appendix 21 presents the characteristics of group member A1-A3, based on the demographic survey, the personality test result and the interview data.

Group member A1

A1 is 48 years old and educated as post office assistant before she started to study library and information science. She has three children.

A1 is calm and well-balanced and characterized by a low degree of anxiety towards other people, thus indicating that she more easily engages in social contexts. However, the low value on Sociality, Charity and Sincerity also shows that she may have a more reserved and even critical and alert attitude towards other people. In some cases, she may also be perceived as dominating. She is an independent person and has a high feeling of competence. In the context of writing an assignment, this means that she may also perfectly well do an assignment on an individual basis. This is also demonstrated in her utterances on group formation and group work presented in section 9.1.3. Her working approach can be characterized as highly structured and to some extent goal oriented, and she possesses a very high level of self-discipline and responsibility. She prefers to write by herself and get feedback from the other group members *afterwards*. As commented positively by group member A3, A1 does not go into small details or likes to discuss everything. Because of her children, she has been forced to optimize the time spent on project work, which implies that group meetings are very efficient, as pointed out by group member A2.

She has an optimistic attitude towards life but also a tendency to be anxious and worried in specific situations. This may explain the low value on Experimental and Excitement seeking which indicates a more cautious approach towards new things. This is to some extent in contrast to her utterances regarding the project assignment, where she especially likes the first part of the project assignment when all possibilities are still open and challenging. On the other hand, this may also be explained by an openness towards new knowledge and ideas, which is demonstrated in the very high value on Intellectual curiosity. This is further reflected in the high value on Tolerance, indicating an openness towards points of distinction in other peoples' thoughts and values. In addition, when seeking information, she consider herself curious and eager after getting new knowledge. If she accidentally run into information that may be relevant for one of the other group members, she sends the reference to the specific person for further

relevance judgement. She wants to be regarded as a helpful and collaborative group member.

Group member A2

A2 is 31 years old and educated as educationist before she started to study library and information science.

A2 has a tendency to be anxious and upset in stressful situations which may also result in sadness and a sense of guilt. Sometimes, she may experience a need so strong that it can be hard to control. She is not dependent on socializing and in some social situations, she even has a tendency to feel uncomfortable, which to some extent can be associated with shyness. Thus, by some people she may be perceived as reserved and critical; by others warm and indulgent. Feelings are important to A2, in the sense that she more easily is influenced by negative as well as positive emotions. She now and then seeks excitement and is generally very open to experience, which especially is demonstrated in a high value on Imagination, Intellectual curiosity and Tolerance towards other peoples' ideas and thoughts. The imaginative aspect is also reflected in her utterances regarding the start of a project work. Generally, she engages very easily in a subject and gets lots of ideas. In the beginning of the project period, her role is primarily to keep ideas open, and at the end of the period to ensure that the various parts of the assignment are brought together into one product. She thinks, however, finish writing and making a rounding is difficult. Despite her independent nature, she needs feedback from others on her behaviour, for example shown in a need for feedback on her writing from the other group members.

She feels competent and is generally goal oriented, self-disciplined and responsible. She also regards herself rather perfectionistic, for example by going into details with things such as constantly checking the project assignment for errors before deadline. This contradicts to some extent the very low value on Orderliness, indicating a tendency towards a more spontaneous and unsystematic behaviour in certain situations.

Group member A3

A3 is 30 years old and has started, but not finished two studies before she started to study library and information science. The first study was at the School of Education and the second at the School of Journalism.

A3 has a tendency to become anxious and uncertain and may get upset in stressful situations. She is temperamental and has a tendency to demonstrate a lower level of tolerance as well as to adopt a pessimistic attitude in certain situations. She also has a tendency to adopt a critical attitude as reflected in the low value on 'sincerity', 'indulgence' and 'modesty' which in some cases may be perceived as reserved and hostile. She is feeling comfortable with other people, but her well-being is not strongly dependent on company and social contact. Often, she prefers to be alone or to do things on her own. In a group relation for example, she is satisfied about having some time by herself writing instead of writing all together. It is better if one group member prepares a draft, which can be commented on by the others afterwards. Generally A3 is very open to experience. This is for example shown in a high value on Intellectual curiosity and Imagination, indicating an interest in new ideas and thoughts as well as creativity in problem solving. Despite a lower level of activity, she is goal and process oriented and has a very structured and diligent working approach.. As a group member, she also considers herself rather process-oriented. Group meetings should be structured and scheduled and things should be done systematically. She does not distribute a manuscript to the other group members, unless it has been thoroughly worked through. In stead of reading a lot before writing, she writes while she reads: "I prefer not to read too much before I put down some words that should be more than just notes; writing makes me reflect better than reading, and I am worried that I will forget so I want to keep my thoughts" (Interview1A, PD33:223). Concerning the assignment, she often goes into details with the grammar and formulation style. Emotional experiences are also important to A3, which means that she perceive and reflects upon both positive and negative emotions. Sometimes she is driven by a high degree of excitement seeking.

Appendix 22: Group member characteristics – group B

Appendix 22 presents the characteristics of group member B1-B3, based on the demographic survey, the personality test result and the interview data.

Group member B1

B1 is twenty-five years old and educated as organist before she started to study library and information science.

B1 is a calm person with a middle temper. She has an impulsive nature but may also get very uncertain and nervous in stressful situations. She has a tendency to avoid social stimulation, which gives the impression of an individualist person, which also has been mentioned by group member B2. However, this does not mean that she does not like other people; on the contrary she seems to be a warm person who is able to establish close relations with other people. She is not dominating, rather she can be characterized as modest and cautious. In group work, for example, she may take the initiative if none of the other group members do so; but rather she prefers to do other things. Sometimes she also seeks excitement which may be associated with the impulsive part of her personality. Her level of activity can be described as low, which does not mean the same as lazy, but may indicate that she has a more slow and relaxed approach to activities, such as work or group work. As an example, the group had planned to read a book before their next meeting but B1 failed to read it. However, in order to do some reading, she read an introduction to the author and an explanation of his theories instead. This was after all easier than doing it herself. B1 has a high level of imagination, is intellectual curious and possesses a very high tolerance towards other people. This is further demonstrated in a high value on Agreeableness, especially expressed in facets such as Trustful, Sincerity and Indulgence. What Conscientiousness is concerned, the low values may indicate that B1 sometimes have difficulties in controlling her impulses; it may be difficult for her to discipline herself and sometimes she also lack the feeling of competence and responsibility. In addition, orderliness seems to be difficult for her or may not be that important to her.

Group member B2

Group member B2 is 29 years old and educated as occupational therapist before she started to study library and information science. At this point of the study, she is in an advanced stage of pregnancy.

B2 is a person who tends to approach life with some anxiety and pessimism. She has temper, is very sensitive to stressful situations, such as a deadline in relation to the project assignment, and has a tendency to react with nervousness, uncertainty and frustration. Parallel to a sometimes pessimistic behaviour, she also easily experiences positive emotions such as happiness, love and excitement, which is indicated by the high value on Positive emotions. This shift in feelings may be an aspect of the remarkable high importance emotions seem to be to her and her well-being. B2 is also characterized by being a warm and social person, who likes and easily engages with other people as well as care about their well-being. The low value on Agreeableness, however, also indicates a sceptical and critical nature, which by some people may be perceived as reserved.

She has an imaginative mind and a high level of tolerance towards other people's thoughts, values and ideas. She generally feels competent, is self-disciplined and possesses a high degree of orderliness. She works hard to get things done in time, also as a way to avoid time pressure and the associated feeling of stress. The strong demands on herself also apply to others, for example by expecting the same high work ethic. In association with group work, she gets very irritated if the other group members fail to do as agreed upon in the group or when they show up too late for a meeting. With regard to the project assignment, she prefers to write immediately, also as way to reduce stress when she can see the exact work she has been doing. Though she has a high value on Imaginative, she thinks the analyzing and synthesizing part of a project assignment is very difficult; rather, she prefers the descriptive part and a concrete and practical approach to problem solving. Despite her social attitude, B2 also has a tendency towards a competition minded nature, and she often adopts a leading role. What group work is concerned, she prefers group members with the same ambition as her and do not want to spend her time on saving weak group members. She sometimes behave spontaneously, dominated more by action than by thinking.

Group member B3

Group member B3 is 23 years old and has no further and higher education prior to the study of library and information science. B3 can be characterized as a calm person with a low temper, who generally has a very optimistic approach to life. She is a very warm and cheerful person, to whom emotions are very important. She is open to experience and attracted by company. This is for example seen in her preference for group work in all the previous assignments at the study. She thinks it is very difficult to work alone without anyone to discuss and share the responsibility with, which may also be associated with a sometimes low feeling of self-confidence. As a group member, she may be perceived as a highly agreeable person. The very high values under Agreeableness indicate that she generally trusts and cares about other people and likes to be honest and open with them. She is also very concerned about other people's reactions to her behaviour and tries to avoid conflicts for fear of annoying other people.
Sometimes, she experiences her own behaviour as naive. She would also like to be more critical, for example in her reading of theory for an assignment. With importance to the project assignment, she has a high level of imagination but also a small tendency towards convenience, for example shown in the lower level of intellectual curiosity. With relevance to group work, B3 perceives herself as a competent and self-disciplined person, though this is very much dependent on the impact from other people, such as other group members. She has a very strong feeling of responsibility, and likes orderliness and structures as a way to feel confident and secure. Outlines and plans in a project assignment are examples of this.

Appendix 23: Group member characteristiscs – group C

Appendix 23 presents the characteristics of group member C1-C4, based on the demographic survey, the personality test result and the interview data.

Group member C1

Group member C1 is 24 years old and has no further and higher education prior to the study of library and information science. C1 is a calm person, but has also a strong tendency to experience negative emotions such anger, bitterness, disappointment, stress and frustration. This is also emphasized by a sometimes pessimistic approach to life. However, also strong positive emotions such as love, happiness and excitement is experienced by this group member. As such, emotional experiences are very important to C1 in the sense that she reflects upon, is affected by as well as concerned about any experience of negative or positive emotions. Sometimes a perceived need is felt so strong by her that it can be hard for her to suppress. She likes company, but the low value on Social also indicates an independent nature and a tendency towards individualism. In some social situations she may even feel shy and uncomfortable, which by some people can be perceived as reserved. She can be very stubborn and dominant, but in relation to group work, however, she tends to be more indulgent. She is generally open to experience, for example shown in an high value on Emotional deepness as well as Tolerance towards other people's values, ideas and thoughts. In relation to the project assignment, she likes to spread out a subject as a starting point to identify all possible aspects of a subject or problem. She has a very high degree of imagination and intellectual curiosity. When she writes, she often get a lot of associations and writes them into the rough draft, which is one of the reasons why she prefers to write on her own. C1 feels competent but not necessarily responsible. It is also very important for her to feel respected, for example by the other group members. Otherwise, she looses interest and feels like retreating. She likes order and structures but sometimes she finds it difficult to discipline herself. She is very concerned about the other group members reaction to her behaviour, for example if they should think that she has not contributed enough to the project assignment.

Group member C2

Group member C2 is 25 years old and has no further and higher education prior to the study of library and information science. She can be characterized as a calm and generally optimistic person who easily engages with other people. She likes company

and often seeks excitement. She has a very high imagination and likes to experiment with new things. Her general openness to experience is also shown in the high value on Tolerance. She respects the diversity of values, believes and opinions across people. She is helpful and generally trusts other people, and she also aims at being honest with people herself. However, she may also be perceived as a rough and dominant person by some people, for example in situations where her enthusiasm for a specific thing is not shared with others. C2 is an ambitious, competent and responsible person, who makes heavy demands on herself. Despite a medium performance focus and self-discipline, keeping focus with regard to the project assignment, is very important to her. She easily gets impatient and prefers action rather than to think things too much over. For example, she often gets impatient when she reads, rather she prefers to write or to engage in a discussion.

Group member C3

Group member C3 is 28 years old and has been studying the English language for two years at the university before she started to study library and information science. She is an emotional calm and stable person, who tends to seek and experience love, happiness and excitement in life. In addition, she is a social and warm person, who likes company and very easily engages with other people. She may, however, also sometimes experience frustration, uncertainty and pessimism. In addition, perceived needs can sometimes be very hard for her to suppress. She is an active person and very open to experience in the sense that she is imaginative, experimental and possesses a very high tolerance towards other people's thoughts and opinions. In turn, Intellectual curiosity is only low. In contrast to the general high values on Openness to experience, C3 generally only obtain low values on agreeableness. This indicates a critical and reserved attitude towards other people that may even tend to be aggressive, competitive and dominant in some situations. With relevance to the project assignment, C3 has a high feeling of competence and work ethic, but a low self-discipline. She also has a slight tendency towards an unsteady behaviour, for example when she often comes a little bit late for an appointment. Her performance focus is medium like her level of responsibility.

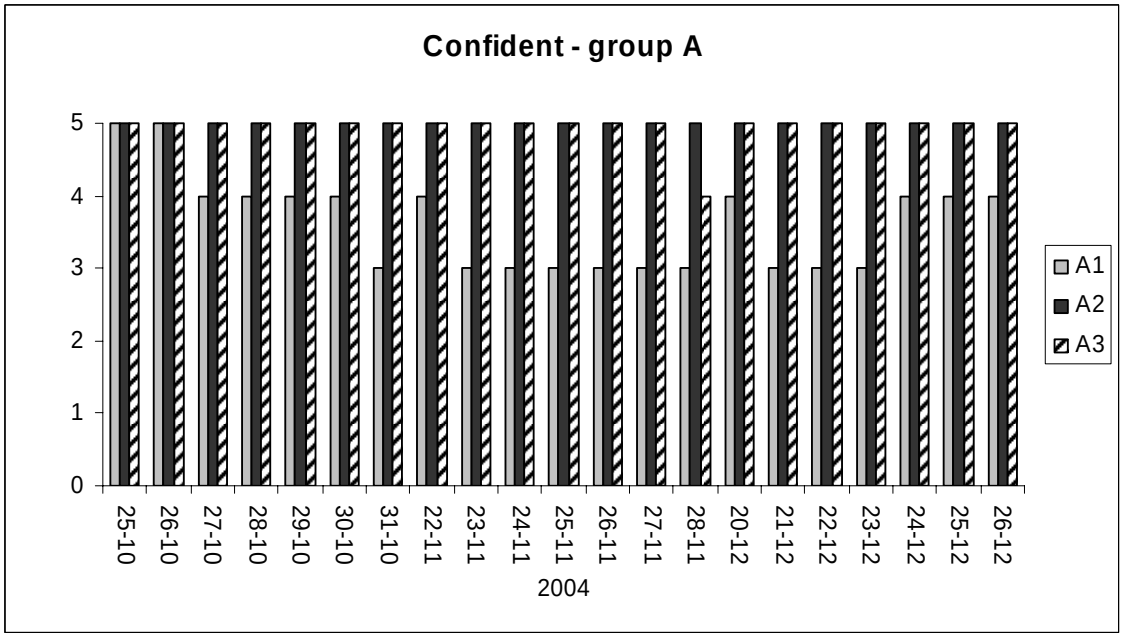
Group member C4

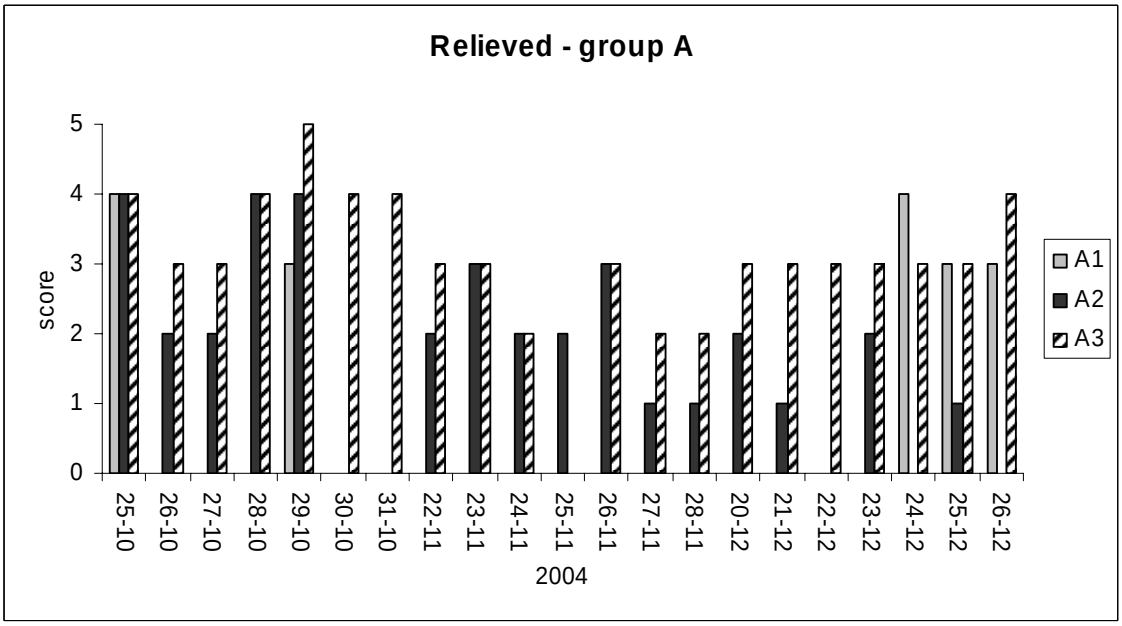
Group member C4 is 27 years old and has been studying Public health and Economy at the university before he started to study library and information science. C4 can be

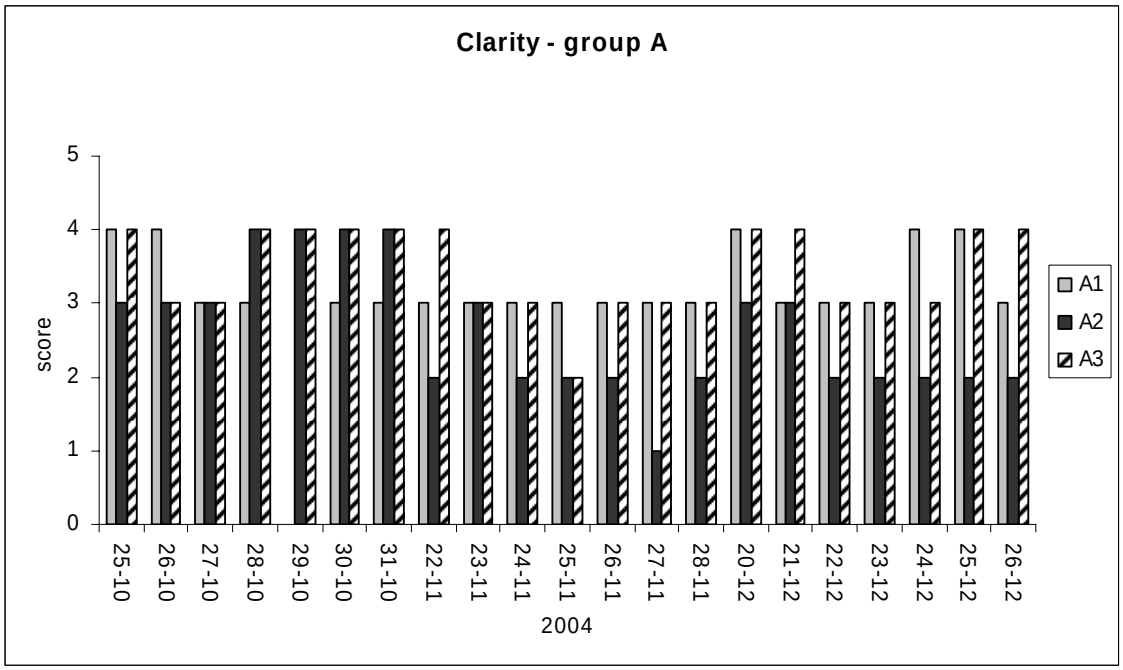
characterized as a very calm and relaxed person with a low tendency to get uncertain and upset. Once in a while, he may get angry and irritated and possess a pessimistic attitude. Generally, he is warm and cheerful and he easily engages with other people as well as enjoys company himself. Of relevance to the project assignment, he has a high level of activity, is imaginative and intellectual curious. He often plays a leading role in the beginning of a group work in order to set the scene and is very keen on knowing which way to go to stay interested and motivated. For example, he finds it difficult to concentrate on reading thoroughly, if he is unsure of its relevancy to the assignment topic. He also has a strong tendency towards an experimental behaviour, trying out new things and experiences in stead of a conservative and safe approach. This is further demonstrated in an high value on Tolerance, indicating an openness towards new and different thoughts, opinions and values. C4 can also be characterized as a trustful and helpful person who generally has a high level of sympathy towards other people. However, he may also be perceived as a critical and reserved person, as reflected in the low value on Indulgence, and in some situations have a tendency to behave dominantly. Looking at Conscientiousness, he has a medium level of steadiness, performance focus and feeling of competence. In contrast, his self-discipline and feeling of responsibility is low, meaning that work may wait if something more interesting should turn up.

Appendix 24: Affective experiences – Group A

Appendix 24-26 show the group members' affective experiences as reported in *diary* 1-3.






Clarity - group A
score
2004
A1
A2
A3
0
1
2
3
4
5
25-10
26-10
27-10
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29-10
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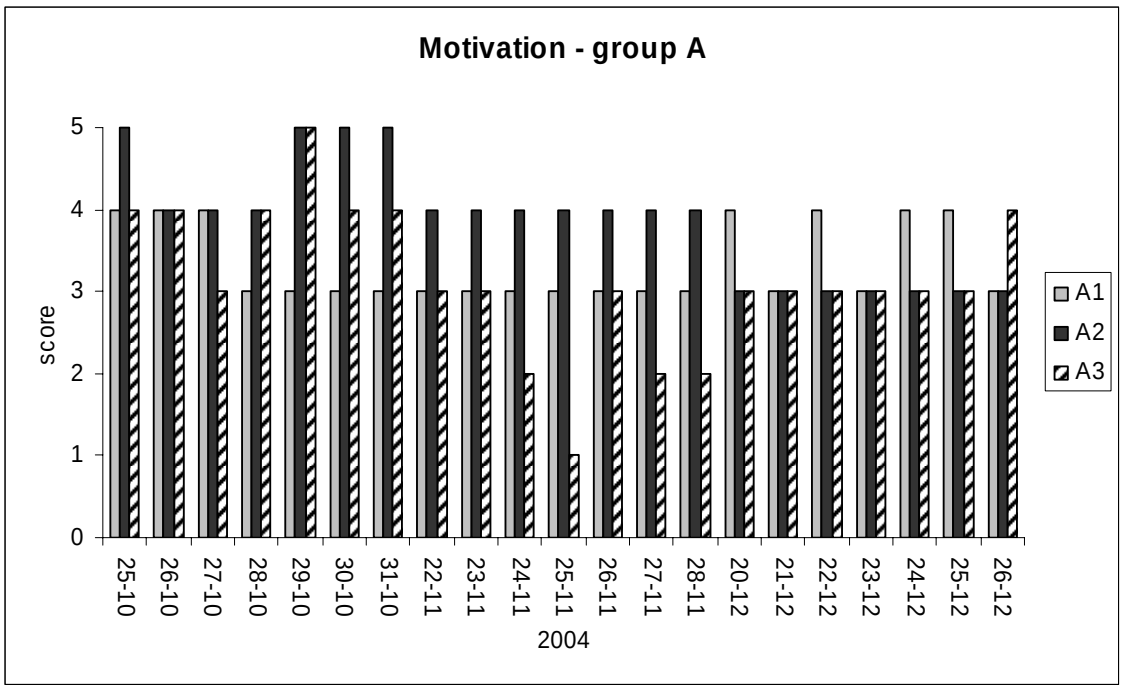
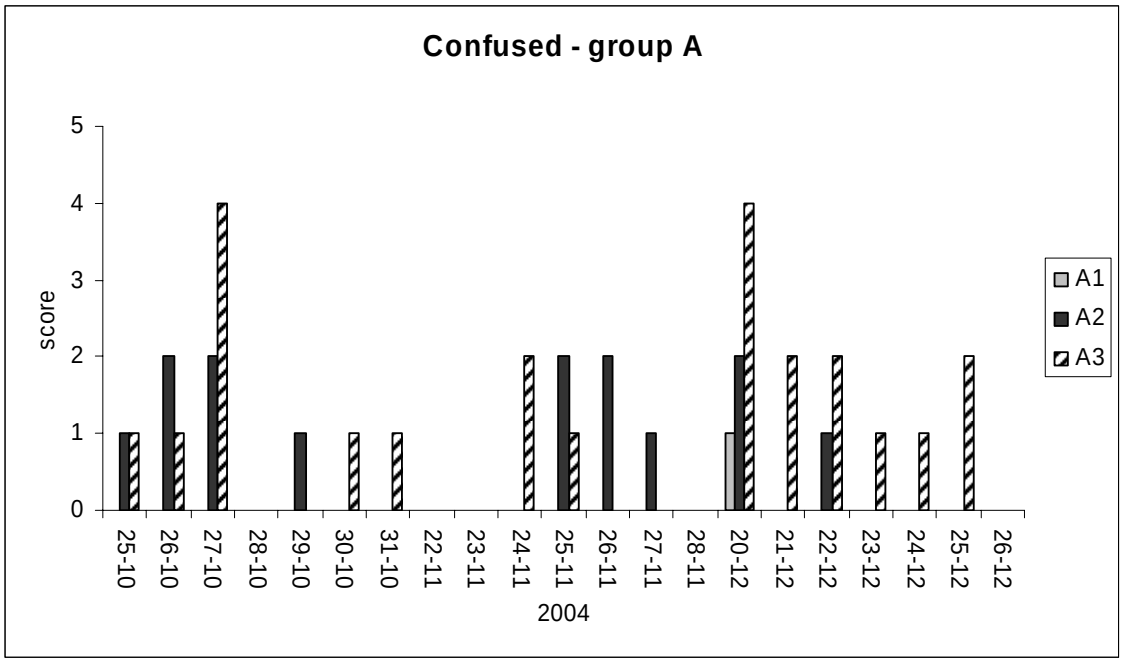
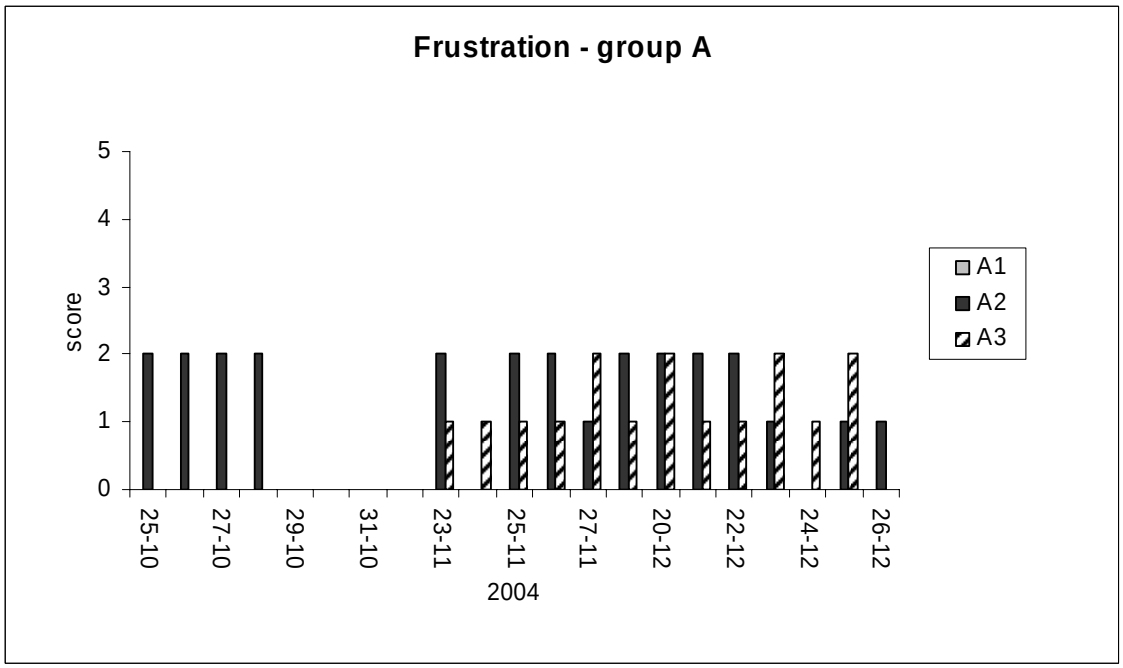
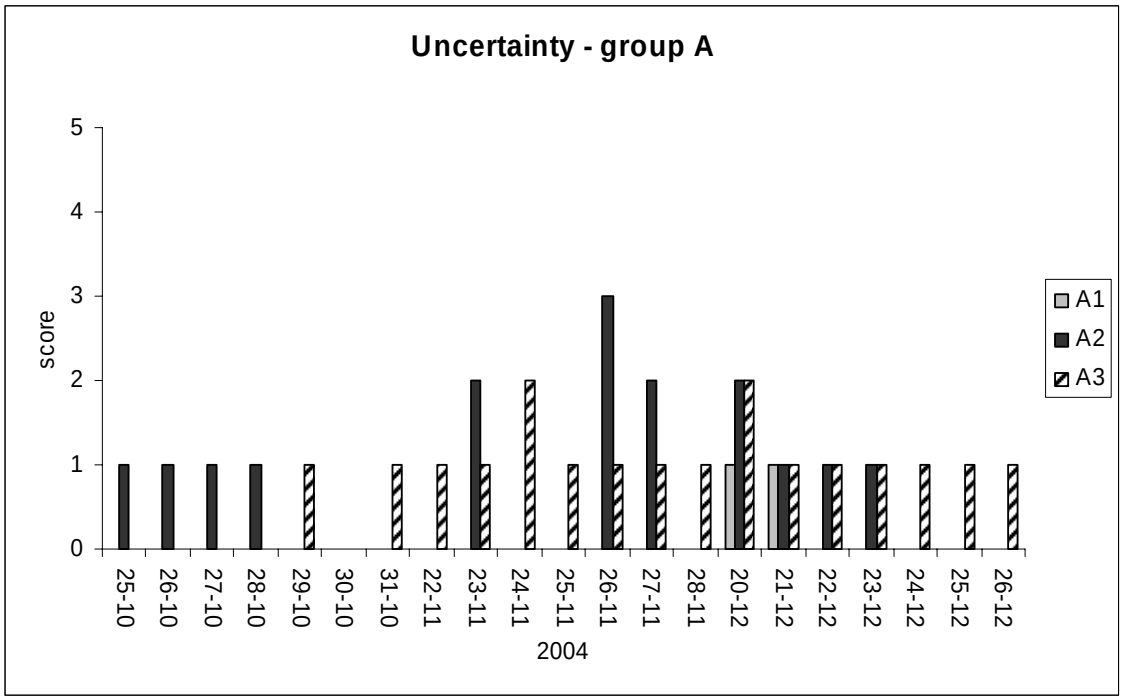
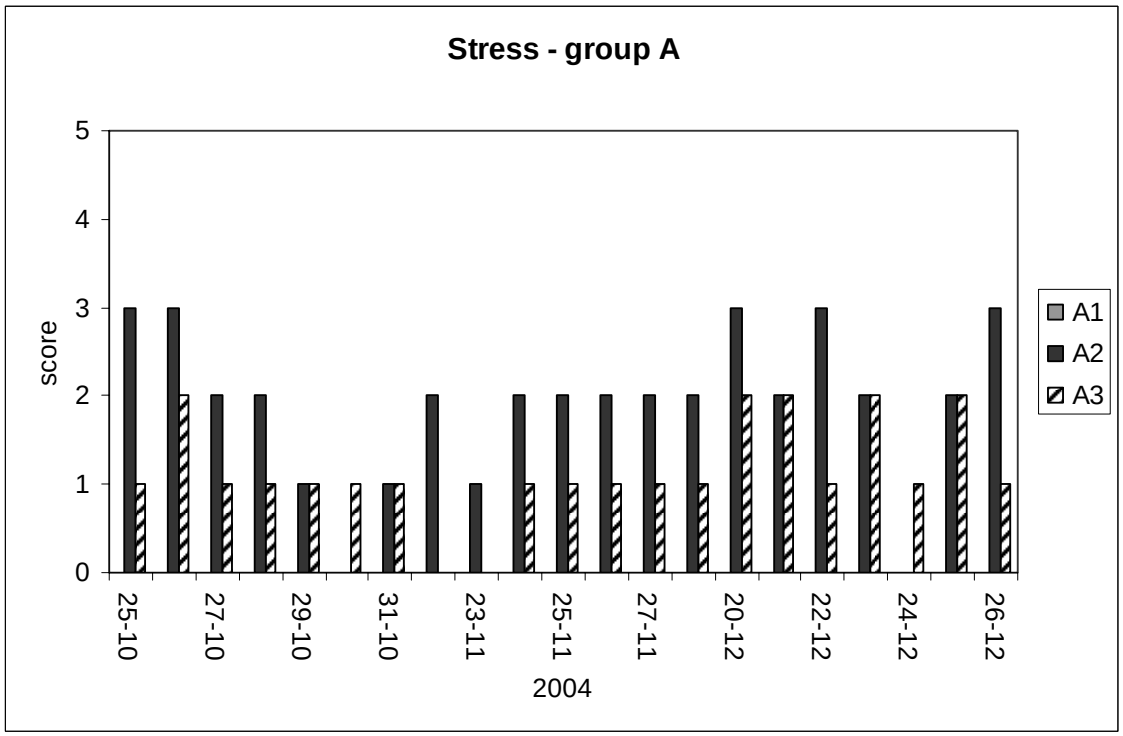
24-12
25-12
26-12


Motivation - group A
score
2004
A1
A2
A3
0
1
2
3
4
5
25-10
26-10
27-10
28-10
29-10
30-10
31-10
22-11
23-11
24-11
25-11
26-11
27-11
28-11
20-12
21-12
22-12
23-12
24-12
25-12
26-12

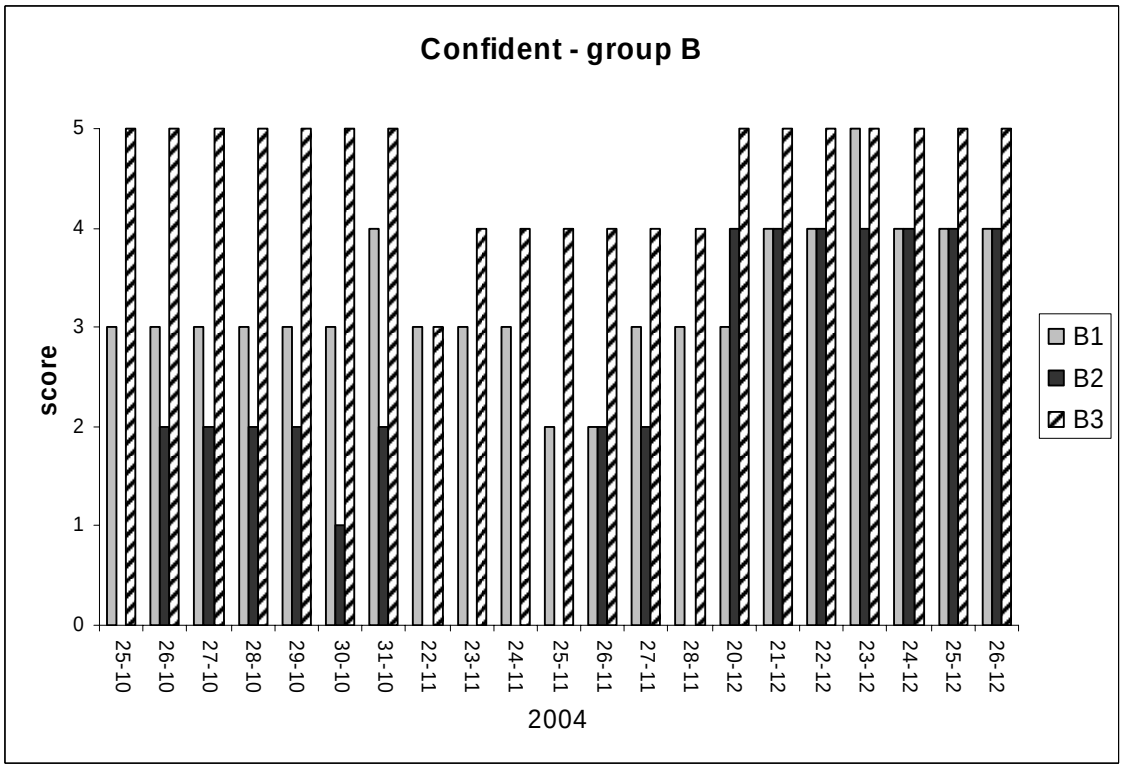

Confused - group A
score
0
1
2
3
4
5
25-10
26-10
27-10
28-10
29-10
30-10
31-10
22-11
23-11
24-11
25-11
26-11
27-11
28-11
20-12
21-12
22-12
23-12
24-12
25-12
26-12
2004
A1
A2
A3

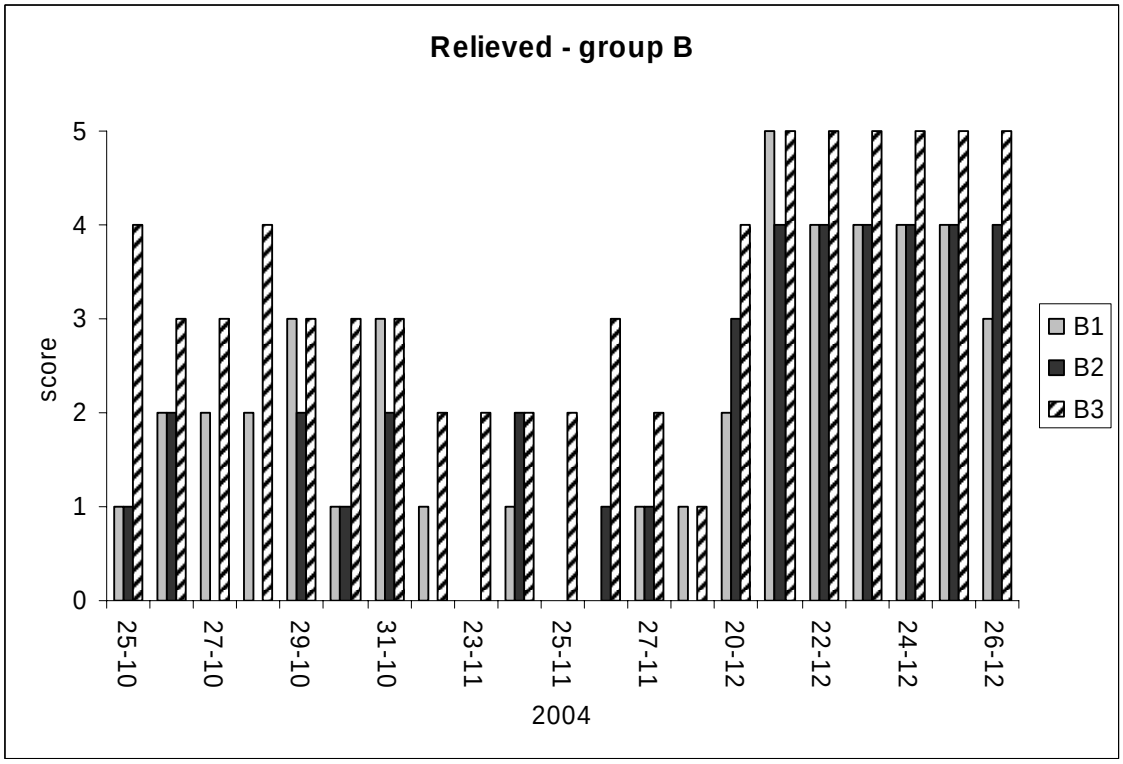

Frustration - group A
score
0
1
2
3
4
5
25-10
27-10
29-10
31-10
23-11
25-11
27-11
20-12
22-12
24-12
26-12
2004
A1
A2
A3

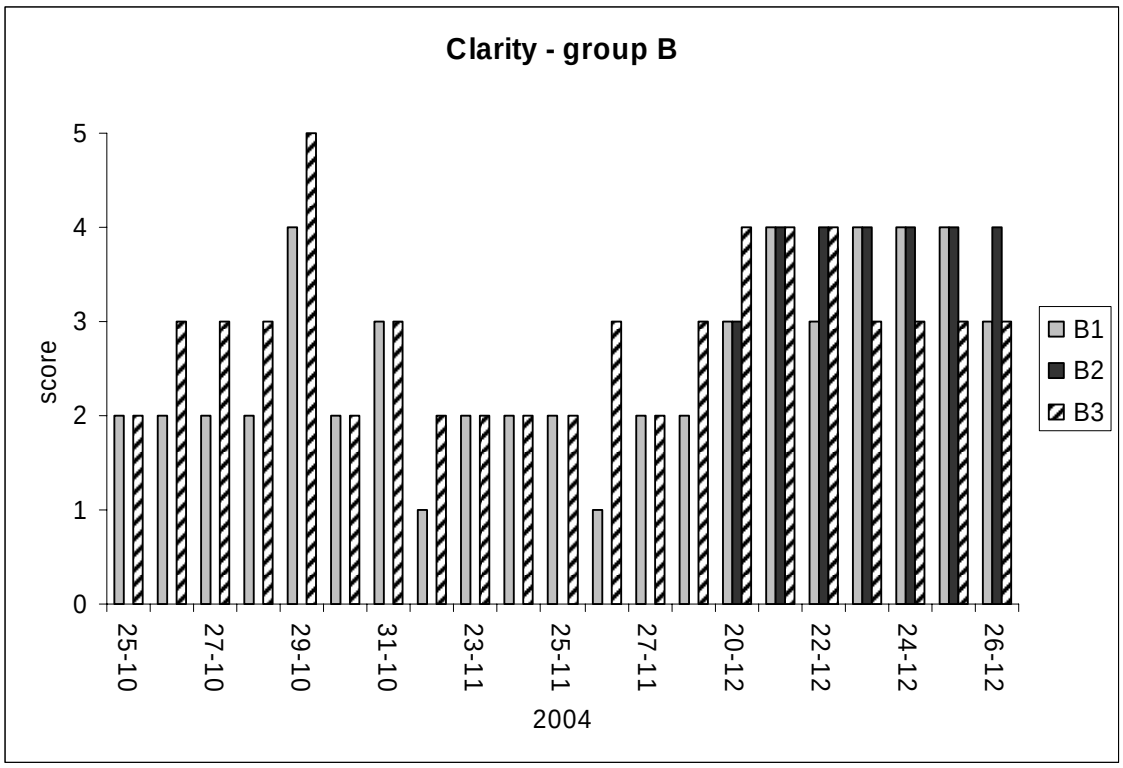

Uncertainty - group A
score
5
4
3
2
1
0
25-10
26-10
27-10
28-10
29-10
30-10
31-10
22-11
23-11
24-11
25-11
26-11
27-11
28-11
20-12
21-12
22-12
23-12
24-12
25-12
26-12
2004
A1
A2
A3

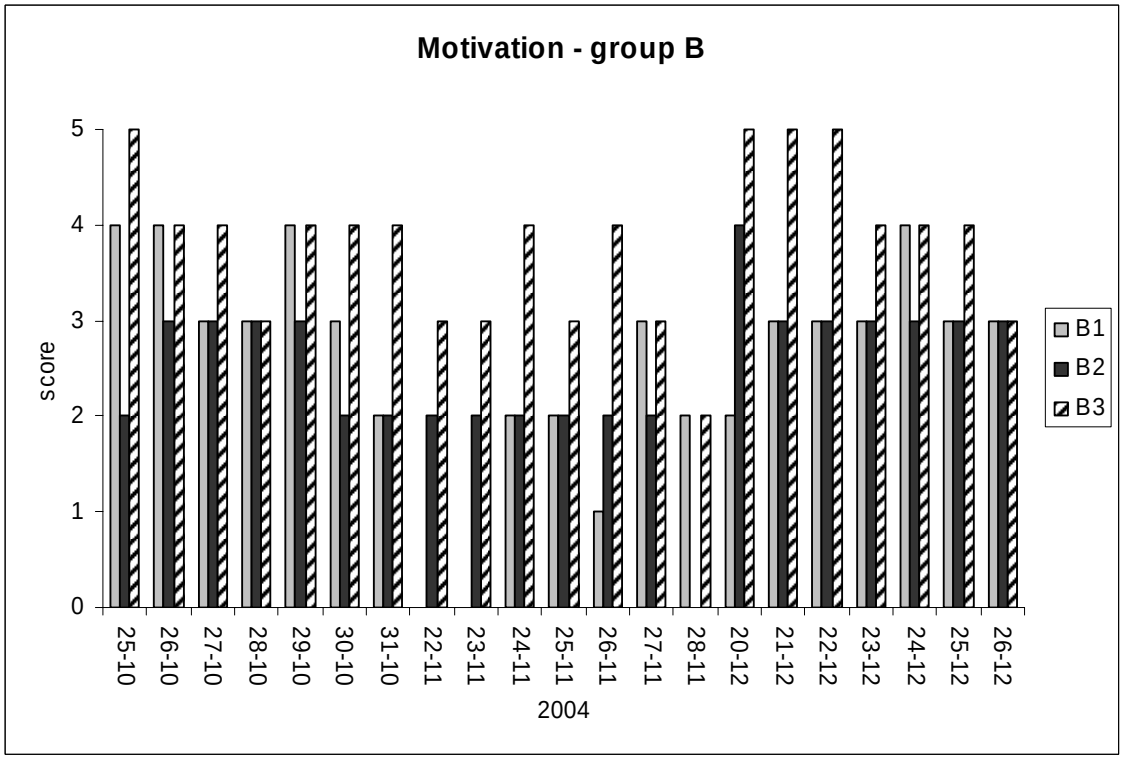

Stress - group A
score
5
4
3
2
1
0
25-10
27-10
29-10
31-10
23-11
25-11
27-11
20-12
22-12
24-12
26-12
2004
A1
A2
A3

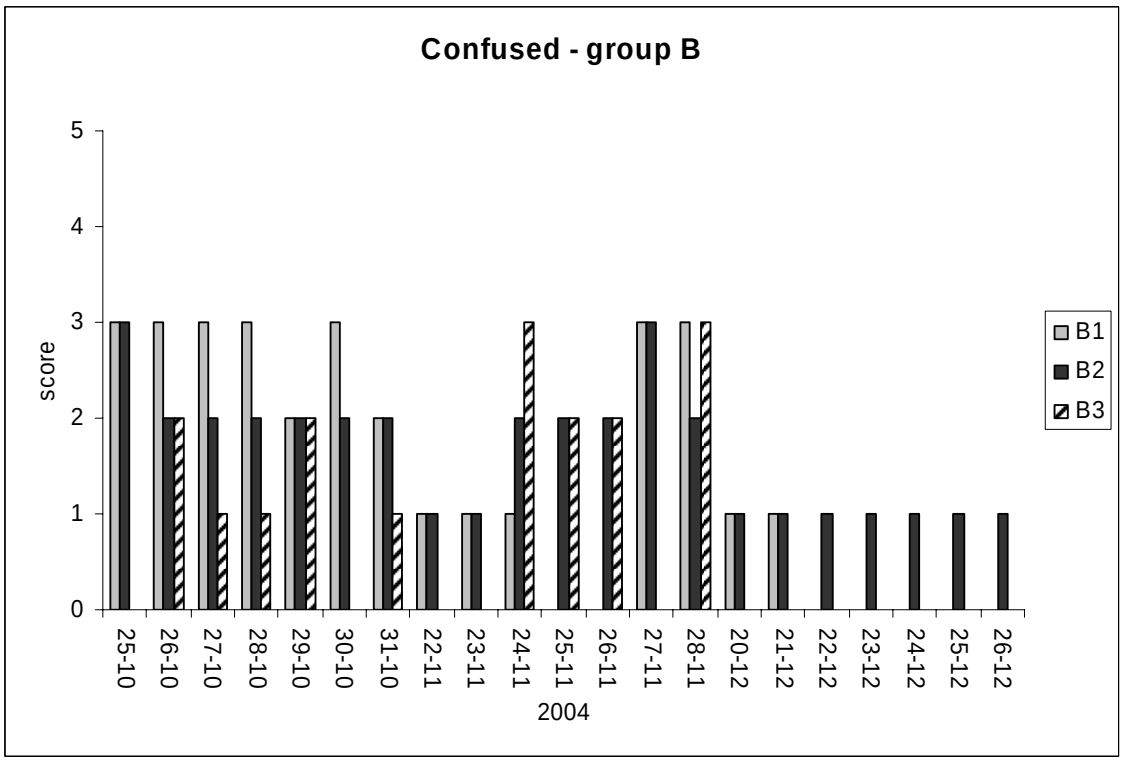
Appendix 25: Affective experiences – Group B

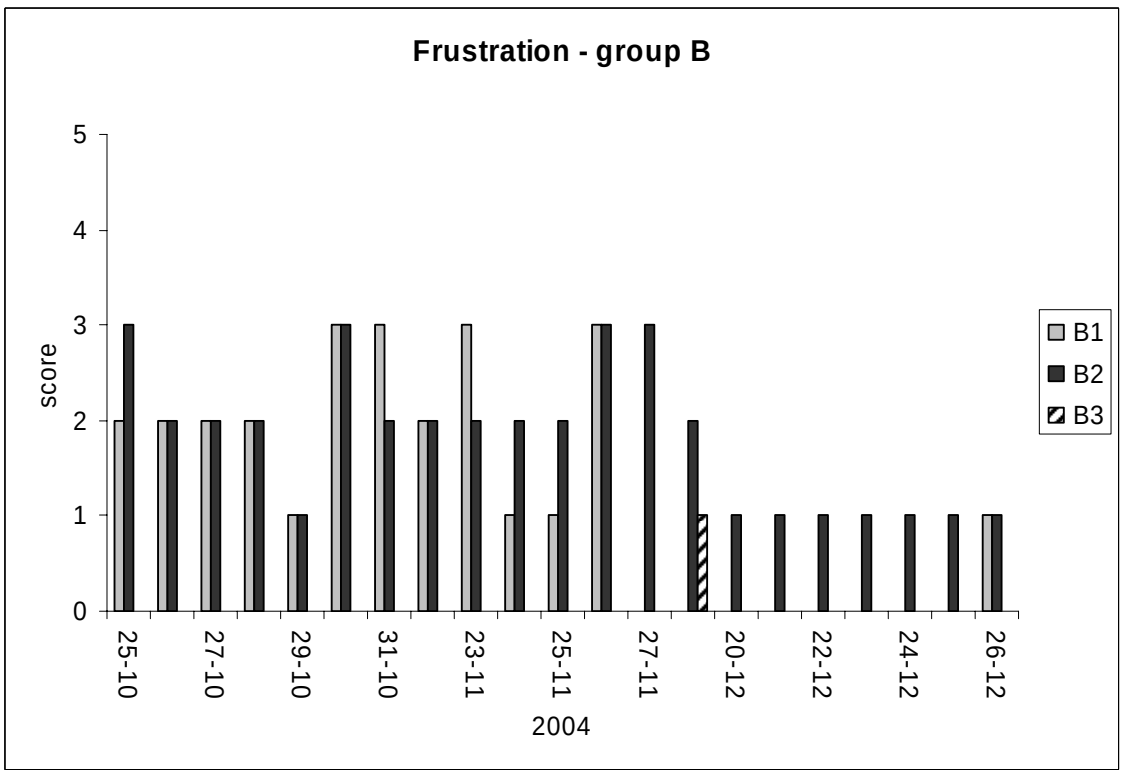


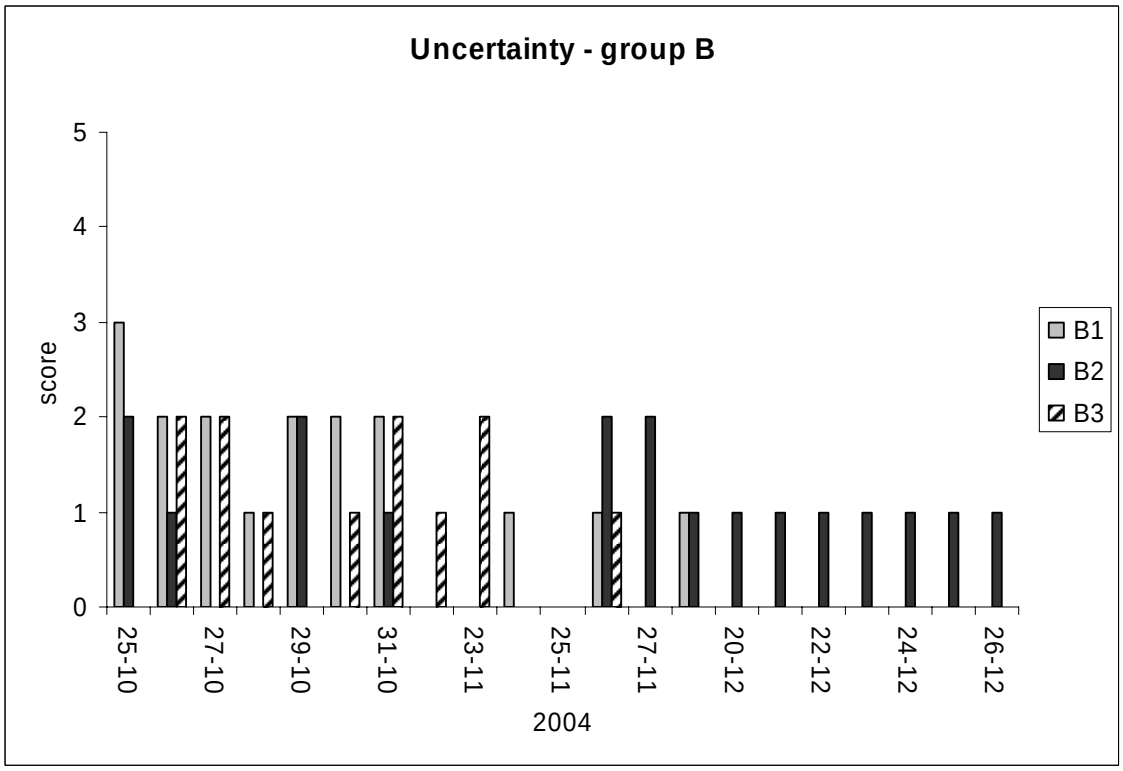


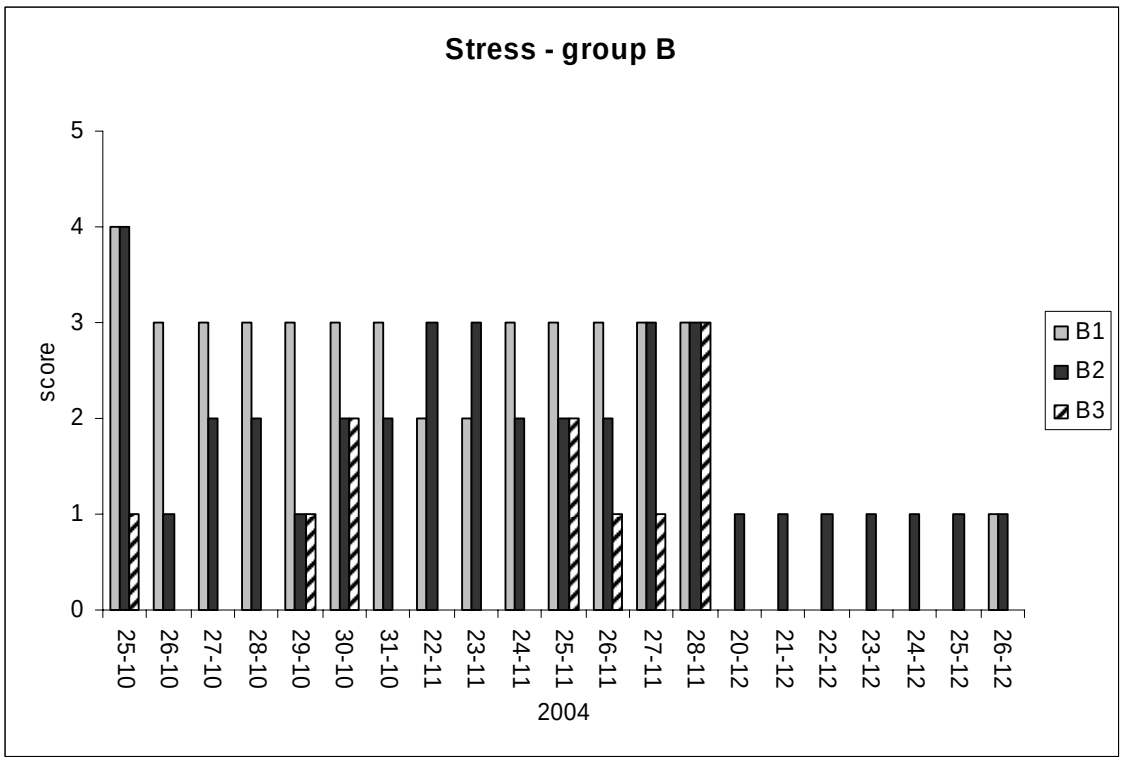

Clarity - group B
score
0
1
2
3
4
5
25-10
27-10
29-10
31-10
23-11
25-11
27-11
20-12
22-12
24-12
26-12
2004
B1
B2
B3


Motivation - group B
score
0
1
2
3
4
5
25-10
26-10
27-10
28-10
29-10
30-10
31-10
22-11
23-11
24-11
25-11
26-11
27-11
28-11
20-12
21-12
22-12
23-12
24-12
25-12
26-12
2004
B1
B2
B3

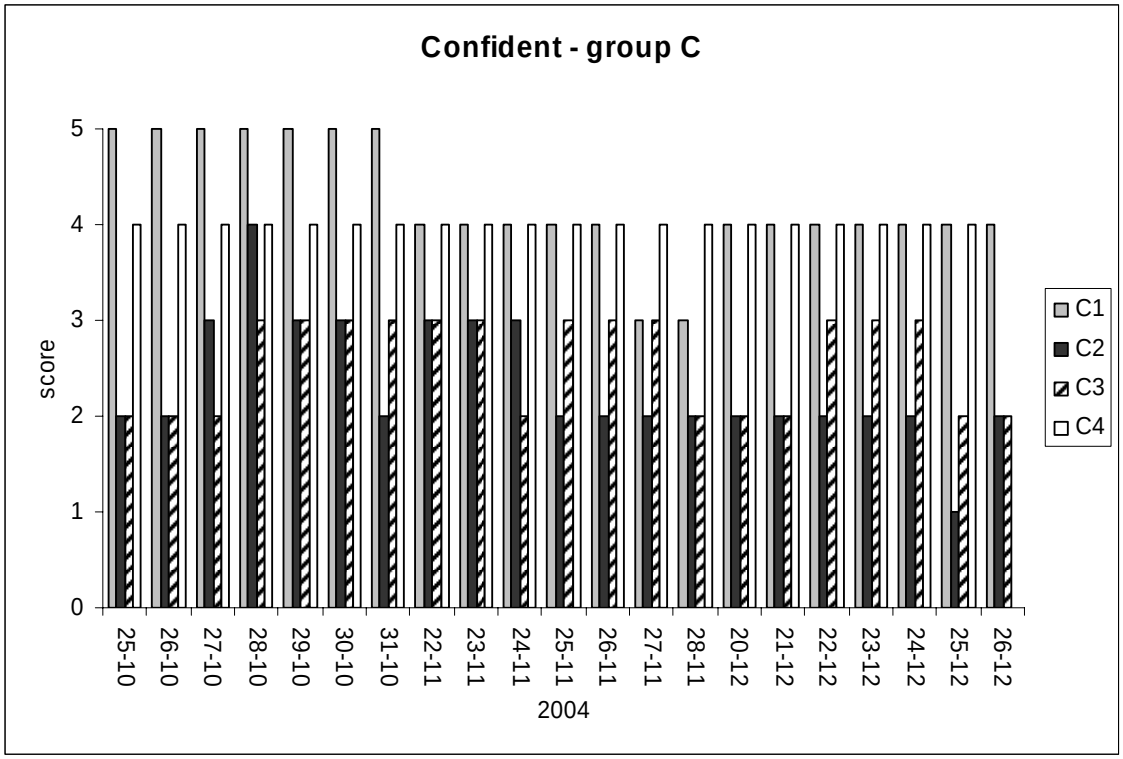

Confused - group B
score
5
4
3
2
1
0
25-10
26-10
27-10
28-10
29-10
30-10
31-10
22-11
23-11
24-11
25-11
26-11
27-11
28-11
20-12
21-12
22-12
23-12
24-12
25-12
26-12
2004
B1
B2
B3

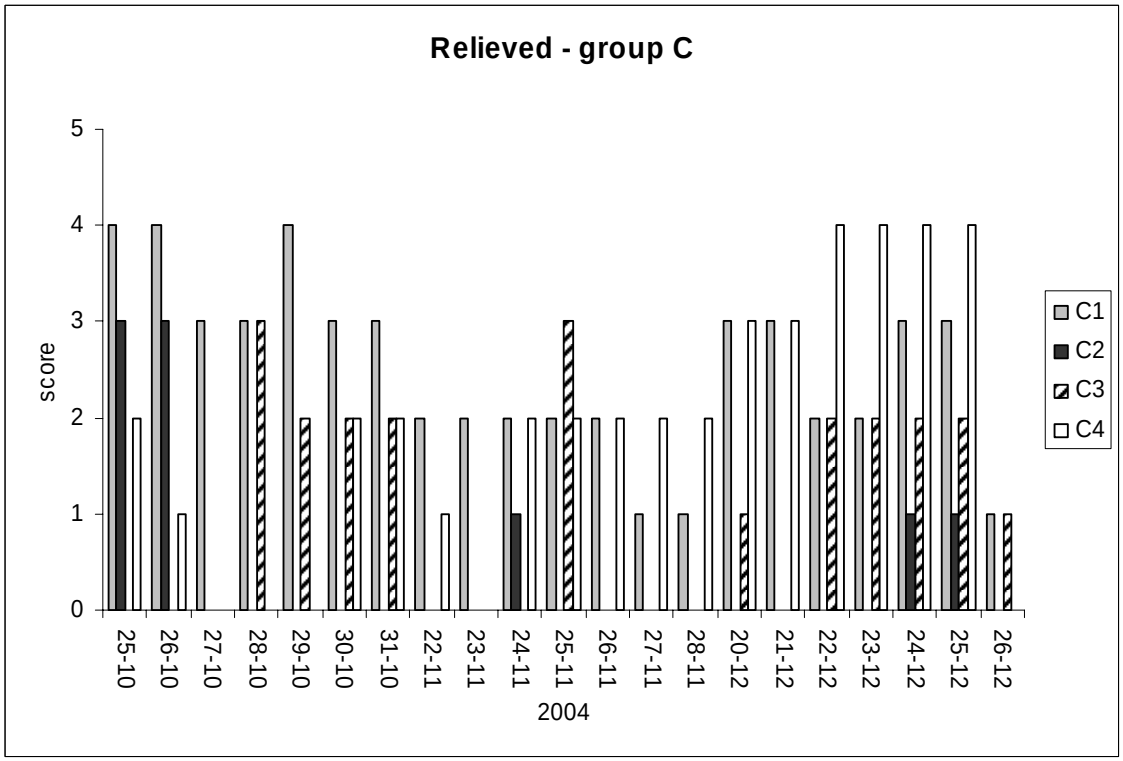

Frustration - group B
score
5
4
3
2
1
0
25-10
27-10
29-10
31-10
23-11
25-11
27-11
20-12
22-12
24-12
26-12
2004
B1
B2
B3

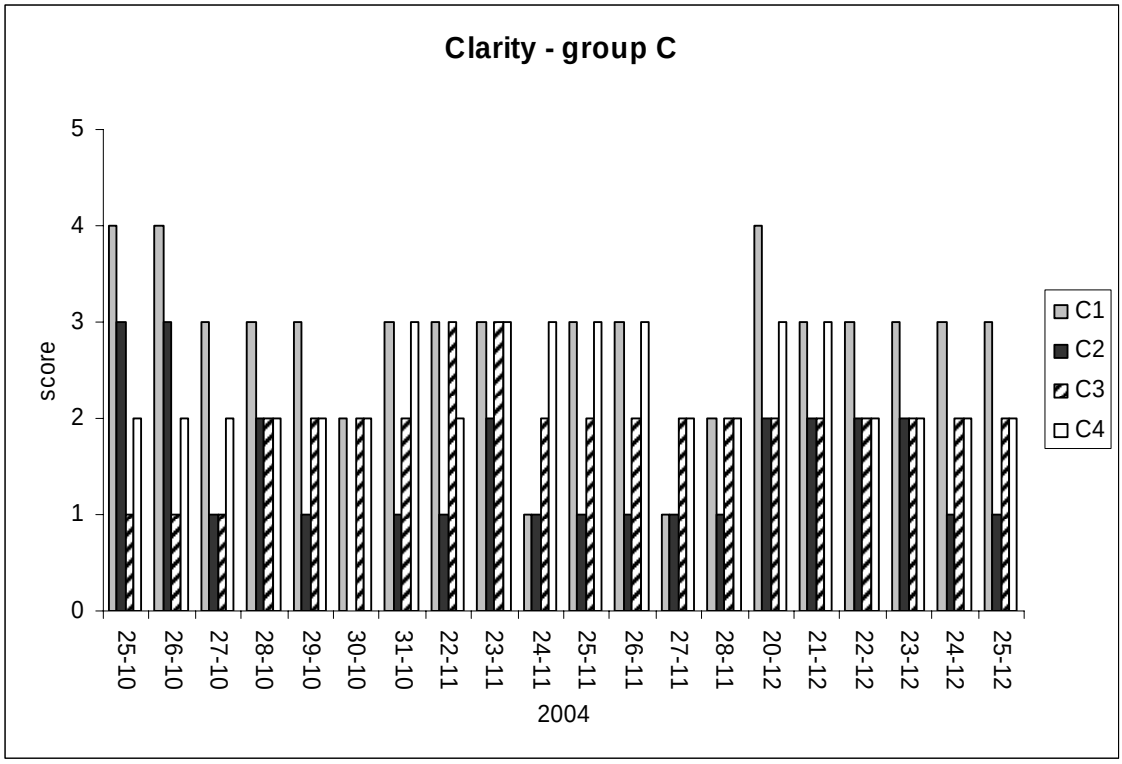

Uncertainty - group B
score
0
1
2
3
4
5
25-10
27-10
29-10
31-10
23-11
25-11
27-11
20-12
22-12
24-12
26-12
2004
B1
B2
B3

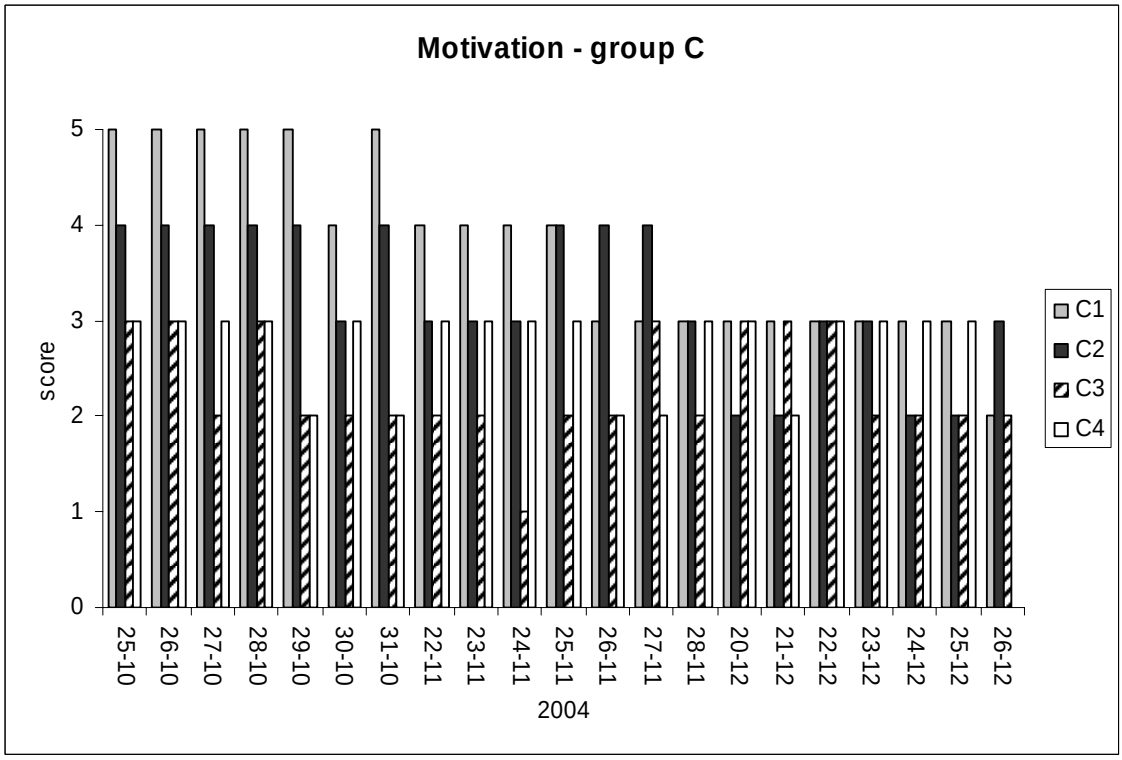

Stress - group B
score
0
1
2
3
4
5
25-10
26-10
27-10
28-10
29-10
30-10
31-10
22-11
23-11
24-11
25-11
26-11
27-11
28-11
20-12
21-12
22-12
23-12
24-12
25-12
26-12
2004
B1
B2
B3

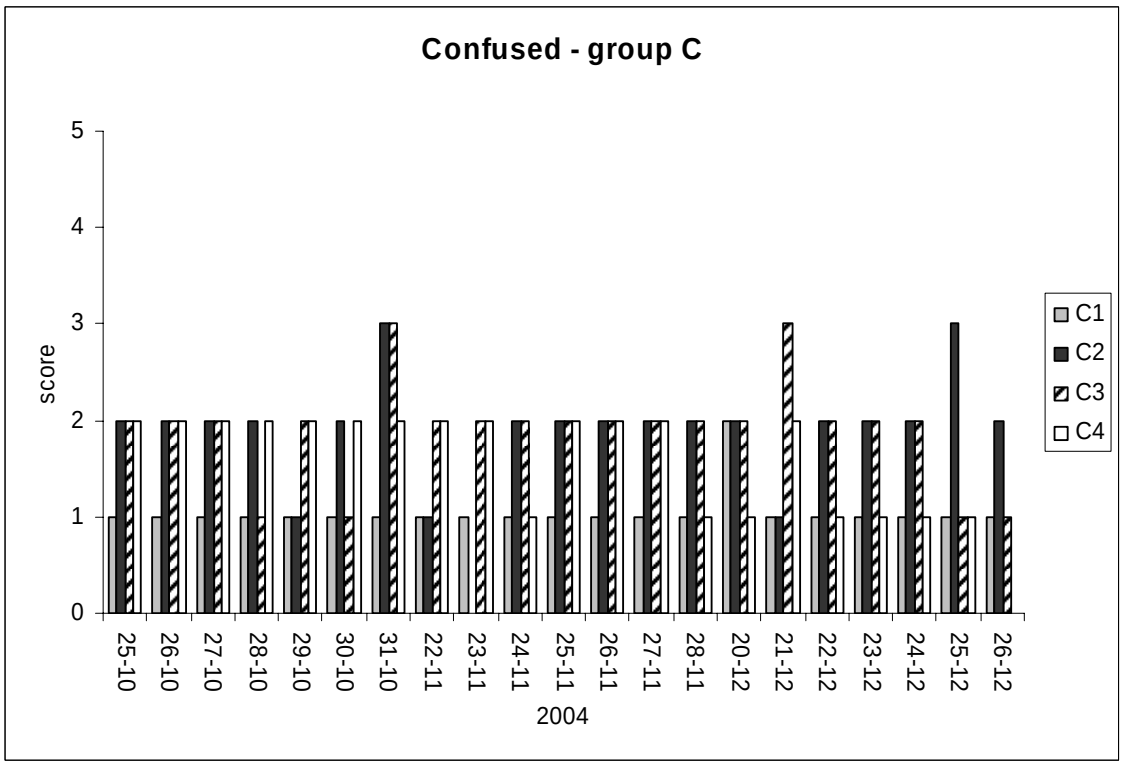
Appendix 26: Affective experiences – Group C

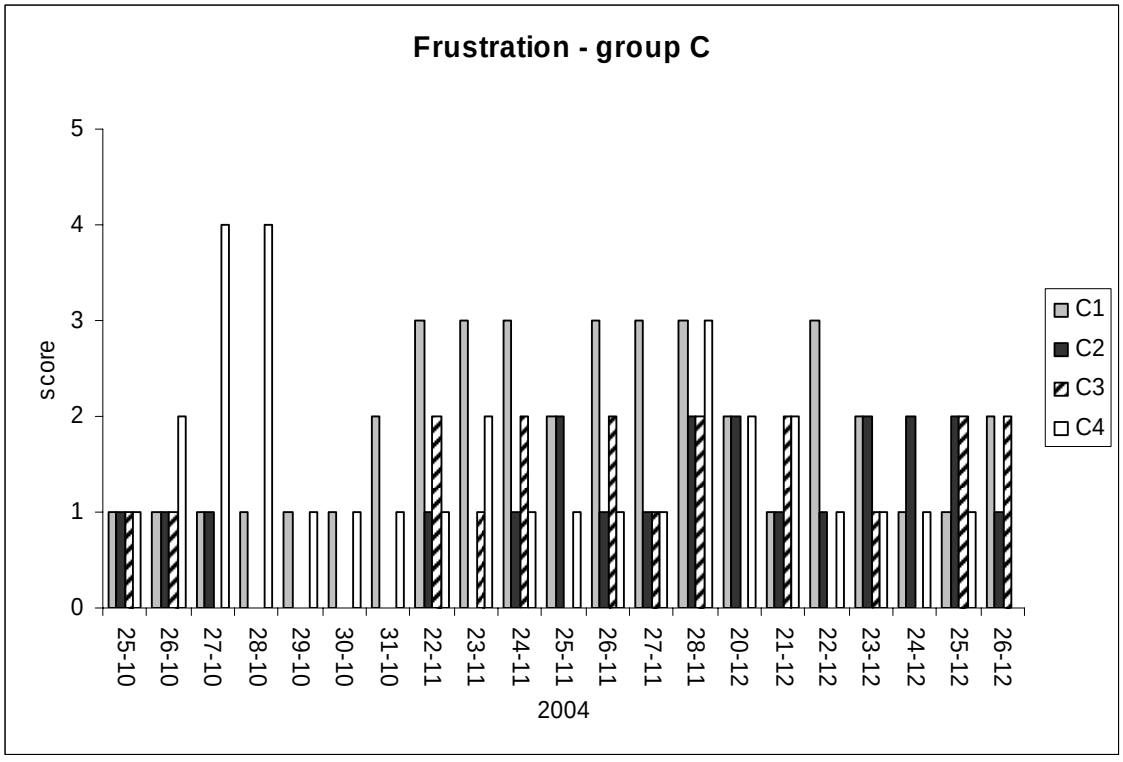


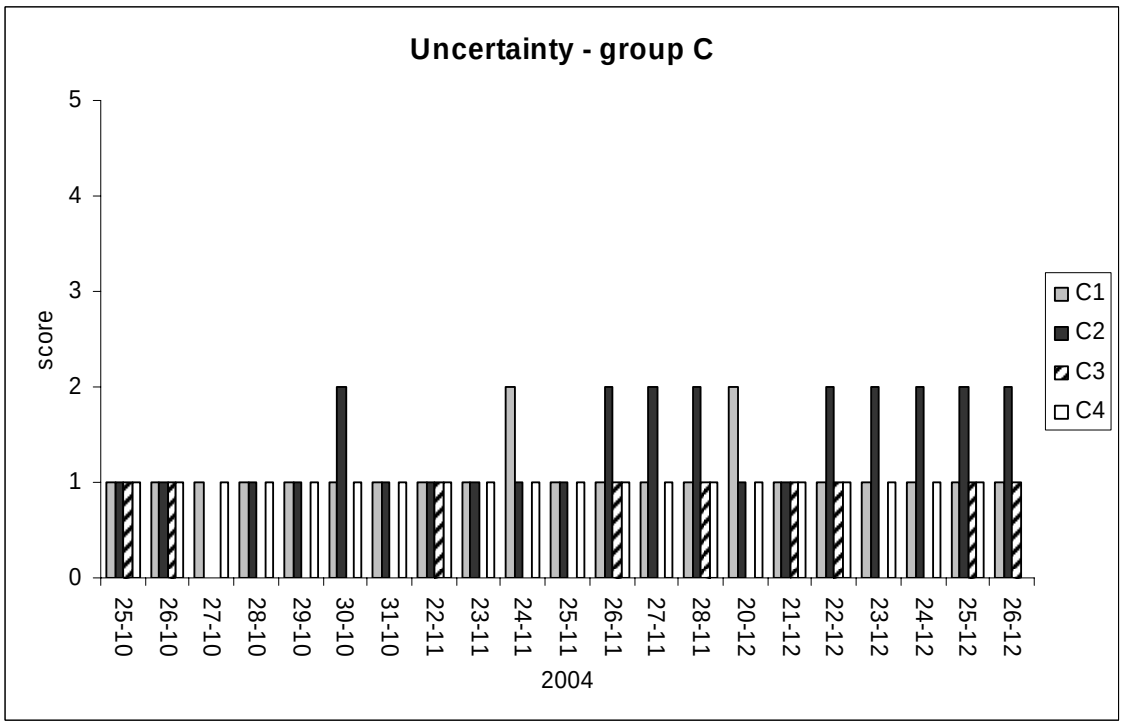


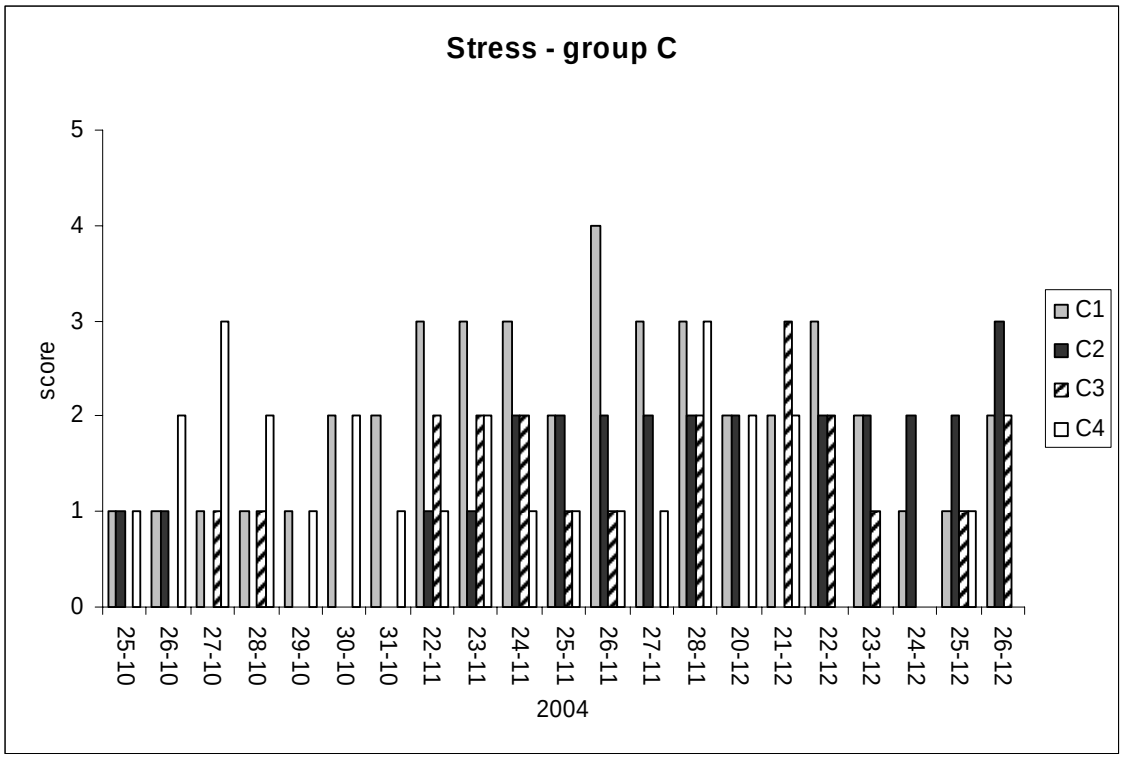

Clarity - group C
score
2004
C1
C2
C3
C4
0
1
2
3
4
5
25-10
26-10
27-10
28-10
29-10
30-10
31-10
22-11
23-11
24-11
25-11
26-11
27-11
28-11
20-12
21-12
22-12
23-12
24-12
25-12


Motivation - group C
score
2004
C1
C2
C3
C4
0
1
2
3
4
5
25-10
26-10
27-10
28-10
29-10
30-10
31-10
22-11
23-11
24-11
25-11
26-11
27-11
28-11
20-12
21-12
22-12
23-12
24-12
25-12
26-12


Confused - group C
score
2004
C1
C2
C3
C4
0
1
2
3
4
5
25-10
26-10
27-10
28-10
29-10
30-10
31-10
22-11
23-11
24-11
25-11
26-11
27-11
28-11
20-12
21-12
22-12
23-12
24-12
25-12
26-12

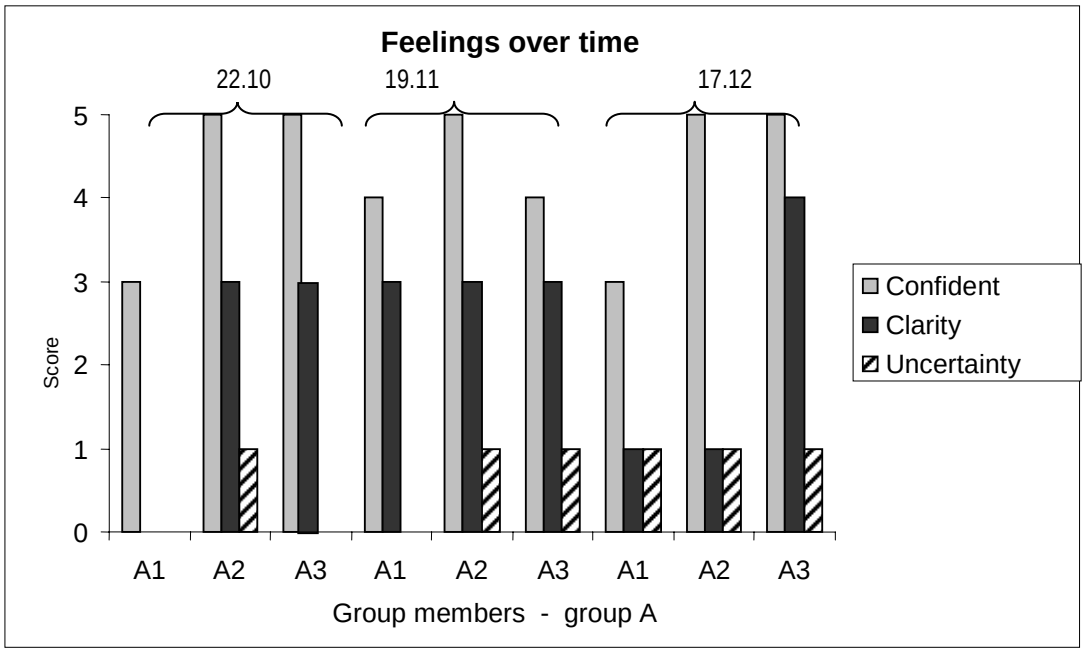

Frustration - group C
score
2004
C1
C2
C3
C4
0
1
2
3
4
5
25-10
26-10
27-10
28-10
29-10
30-10
31-10
22-11
23-11
24-11
25-11
26-11
27-11
28-11
20-12
21-12
22-12
23-12
24-12
25-12
26-12

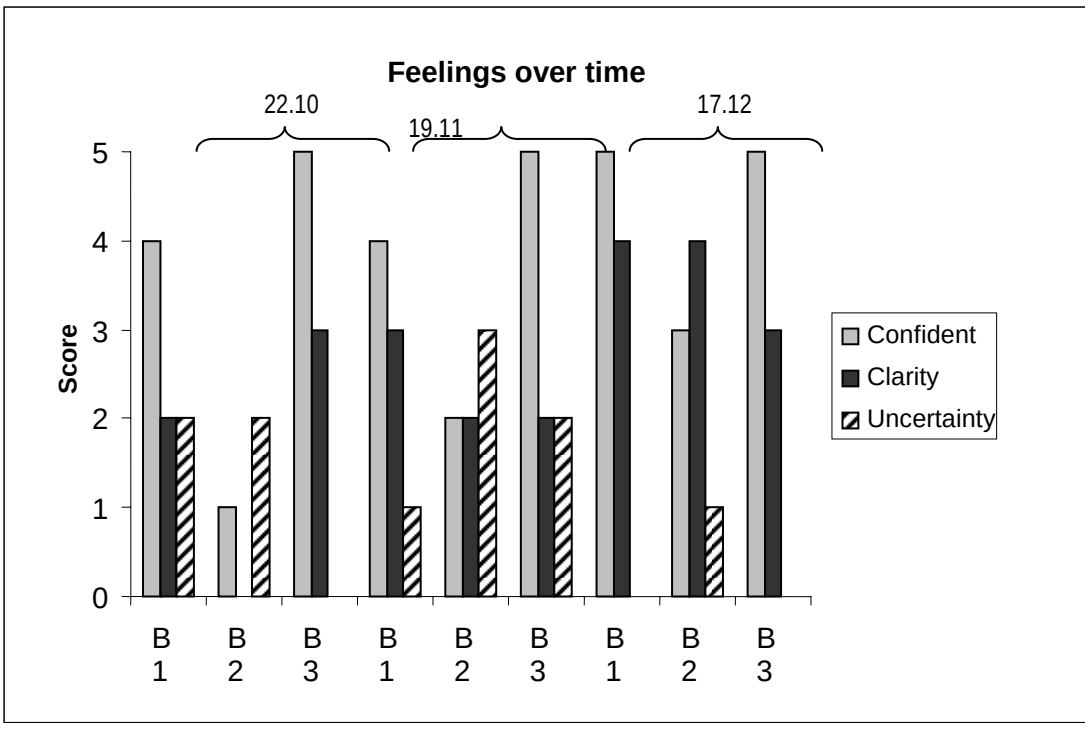

Uncertainty - group C
score
2004
C1
C2
C3
C4
0
1
2
3
4
5
25-10
26-10
27-10
28-10
29-10
30-10
31-10
22-11
23-11
24-11
25-11
26-11
27-11
28-11
20-12
21-12
22-12
23-12
24-12
25-12
26-12

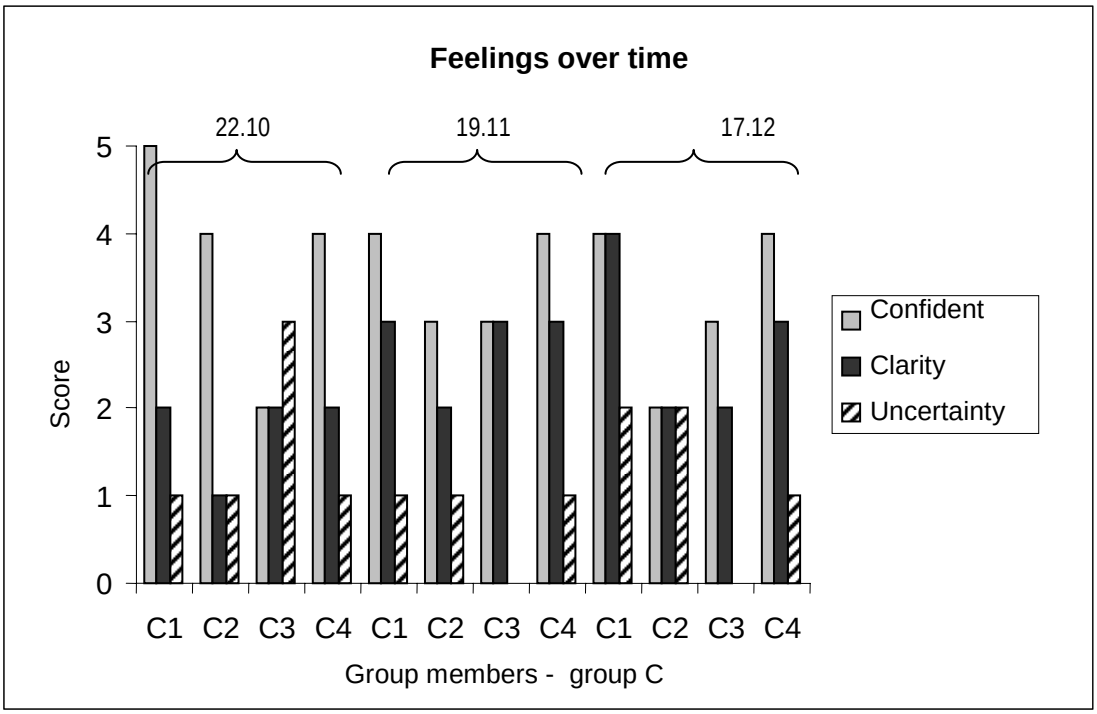

Stress - group C
score
2004
C1
C2
C3
C4
0
1
2
3
4
5
25-10
26-10
27-10
28-10
29-10
30-10
31-10
22-11
23-11
24-11
25-11
26-11
27-11
28-11
20-12
21-12
22-12
23-12
24-12
25-12
26-12

Appendix 27: Affective aspects – process surveys

Appendix 27 shows group members' affective experiences of 'confidence', 'clarity' and 'uncertainty' as reported in *process survey* 1-3.




Feelings over time
22.10
19.11
17.12
Score
0
1
2
3
4
5
B 1
B 2
B 3
B 1
B 2
B 3
B 1
B 2
B 3
Confident
Clarity
Uncertainty


Feelings over time
22.10
19.11
17.12
Score
0
1
2
3
4
5
C1 C2 C3 C4 C1 C2 C3 C4 C1 C2 C3 C4
Group members - group C
Confident
Clarity
Uncertainty

Appendix 28: Work task activities – Group A

The number above the group members refers to the number in the process survey, e.g. A2.1 refers to *Project assignment, activities, general.*

A2.1 *What general project activity are you engaged on at the moment (more x's are allowed)*

	developing a project plan	search information	read information	planning data collection	data collection	data analysis	interpretation of results	writing	finishing the assignment	other 1	other 2	other 3
22-10-2004												
A1	X	X	X	X								
A2	X	X	X									
A3		X	X							X		
19-11-2004												
A1	X	X	X	X								
A2	X		X	X	X	X		X				
A3		X	X	X	X	X	X	X				
17-12-2004												
A1			X			X		X				
A2		X	X				X	X				
A3			X				X	X	X			

Appendix 29: Information activities – Group A

The number above the group members refers to the number in the process survey, e.g. B1.1 refers to *Information seeking, activities, specific information task.*

B1.1 *What kind of information task are you ingaged on at the moment (more x's are allowed)*

	identify information needs	formulate the specific subject	Identify the general subject	searching background information	exploring the subject (during the project assignment)	goal oriented searching	skimming informations sources	searching specific information (e.g. bibliographical information)	talking with people who knows about the subject	re-checking information sources for new information	other 1	other 2	other 3
22-10-2004													
A1	X	X	X	X			X	X					
A2	X	X	X	X		X	X		X				
A3	X	X		X			X		X				
19-11-2004													
A1		X			X	X	X	X		X			
A2		X			X	X	X	X					
A3					X	X							
17-12-2004													
A1					X				X	X			
A2					X	X		X					
A3					X					X			

B2.1 *Mark those information sources (type) that you use at the moment and their perceived importance to the project. (1=low; 3=high).* Only x's with value 2 and 3 are shown

	journals on the Internet	other material on the Internet	printed journals	books	newspapers	teachers	supervisor	group members	teaching
22-10-2004									
A1		X	X	X	X			X	X
A2		X		X				X	
A3				X	X			X	
19-11-2004									
A1		X	X	X	X	X	X	X	
A2									
A3		X		X	X				
17-12-2004									
A1				X		X	X	X	
A2		X		X					
A3	X	X		X	X		X	X	

B2.2 *Mark those sources(form) that you have used to find information (more x's are allowed)*

	the library at RSLIS	the library at RSLIS (online)	other libraries	other libraries (online)	opac	other databases	newsgroups	internet (www)	other 1	other 2	other 3
22-10-2004											
A1			X	X	X	X		X			
A2				X	X			X			
A3				X	X	X					
19-11-2004											
A1			X	X	X	X		X			
A2			X					X			
A3		X		X		X		X			
17-12-2004											
A1			X	X	X						
A2					X			X			
A3	X	X	X	X	X			X			

B2.3 *What relevance criteria do you use at the moment when assessing a document for use (subjective relevance). How important is the criteria (1=low; 3=high).*

Only x's with value 2 and 3 are shown.

	document's layout	the source is relatively new	document seems to be thouroughly worked out	document is giving an overview	language is clear and fluent	the source is respected	the author is acknowledged within his field	document is of scientific high value	other 1	other 2	other 3
22-10-2004											
A1		X	X	X		X	X				
A2		X	X	X			X	X			
A3			X	X	X	X	X	X			
19-11-2004											
A1		X	X			X	X	X			
A2		X	X				X				
A3			X					X			
17-12-2004											
A1		X	X				X	X			
A2		X	X	X			X				
A3			X		X		X	X			

Appendix 30: Work task activities – Group B

The number above the group member number refers to the number in the process survey, e.g. A2.1 refers to *Project assignment, project activities, general.*

A2.1 *What general project activity are you engaged on at the moment (more x's are allowed)*

	developing a project	search information	read information	planning data collection	data collection	data analysis	interpretation of results	writing	finishing the assignment	other 1	other 2	other 3
22-10-2004												
B1		X	X									
B2	X	X	X							X		
B3	X	X	X									
19-11-2004												
B1			X									
B2			X									
B3			X									
17-12-2004												
B1							X	X	X			
B2						X		X				
B3								X	X			

Appendix 31: Information activities – Group B

The number above the group members refers to the number in the process survey, e.g. B1.1 refers to *Information seeking, activities, specific information task.*

B1.1 *What kind of information task are you ingaged on at the moment (more x's are allowed)*

	identify information needs	formulate the specific subject	Identify the general subject	searching background information	exploring the subject (during the project assignment)	goal oriented searching	skimming informations sources	searching specific information (e.g. bibliographical information)	talking with people who knows about the subject	re-checking information sources for new information	other 1	other 2	other 3
22-10-2004													
B1	X	X		X			X						
B2	X	X		X			X						
B3				X	X	X	X						
19-11-2004													
B1					X								
B2					X								
B3		X			X								
17-12-2004													
B1										X			
B2					X								
B3													

B2.1 *Mark those information sources (type) that you use at the moment and their perceived importance to the project (1=low; 3=high).* Only x's with value 2 and 3 are shown

	journals on the Internet	other material on the Internet	printed journals	books	newspapers	teachers	supervisor	group members	teaching
22-10-2004									
B1	X		X	X					
B2	X		X	X				X	
B3	X		X	X					
19-11-2004									
B1			X	X					
B2				X			X		X
B3				X					
17-12-2004									
B1			X	X					
B2	X		X	X		X		X	
B3			X	X					

B2.2 *Mark those sources(form) that you have used to find information (more x's are allowed)*

	the library at RSLIS	the library at RSLIS (online)	other libraries	other libraries (online)	opac	other databases	newsgroups	internet (www)	other 1	other 2	other 3
22-10-2004											
B1	X	X	X					X			
B2	X	X		X				X			
B3	X	X		X		X		X			
19-11-2004											
B1	X	X	X	X							
B2	X	X	X	X				X			
B3	X	X	X	X				X			
17-12-2004											
B1	X	X	X					X			
B2	X	X	X	X	X			X			
B3	X	X	X	X				X			

B2.3 *What relevance criteria do you use at the moment when assessing a document for use (subjective relevance). How important is the criteria (1=low; 3=high).* Only x's with value 2 and 3 are shown.

	document's layout	the source is relatively new	document seems to be thouroughly worked out	document is giving an overview	language is clear and fluent	the source is respected	the author is acknowledged within his field	document is of scientific high value	other 1	other 2	other 3
22-10-2004											
B1		X	X								
B2		X	X	X	X	X	X	X			
B3			X		X						
19-11-2004											
B1		X	X								
B2		X	X	X		X	X	X			
B3				X	X	X					
17-12-2004											
B1			X				X				
B2		X	X	X		X	X	X			
B3					X	X	X				

Appendix 32: Work task activities – Group C

The number above the group member number refers to the number in the process survey, e.g. A2.1 refers to *Project assignment, project activities, general*.

A2.1 *What general project activity are you engaged on at the moment (more x's are allowed)*

	developing a project plan	search information	read information	planning data collection	data collection	data analysis	interpretation of results	writing	finishing the assignment	other 1	other 2	other 3
22-10-2004												
C1	X	X	X	X								
C2		X	X									
C3	X	X	X									
C4		X	X									
19-11-2004												
C1	X	X	X	X						X		
C2			X									
C3		X	X	X								
C4			X							X		
17-12-2004												
C1				X		X	X					
C2			X					X				
C3								X				
C4								X				

Appendix 33: Information activities – Group C

The number above the group members refers to the number in the process survey, e.g. B1.1 refers to *Information seeking, activities, specific information task.*

B1.1 *What kind of information task are you engaged on at the moment (more x's are allowed)*

	identify information needs	formulate the specific subject	Identify the general subject	searching background information	exploring the subject (during the project	gal oriented searching	skimming informations sources	searching specific information (e.g.	talking with people who knows about the	re-checking information sources for new	other 1	other 2	other 3
22-10-2004													
C1	X	X	X	X			X		X				
C2	X		X	X			X						
C3	X		X	X			X		X				
C4			X	X			X						
19-11-2004													
C1		X			X								
C2					X								
C3					X	X	X			X			
C4													
17-12-2004													
C1					X			X	X	X			
C2	X				X	X			X	X			
C3								X		X			
C4										X			

B2.1 *Mark those information sources (type) that you use at the moment and their perceived importance to the project (1=low; 3=high).* Only x's with value 2 and 3 are shown.

	journals on the Internet	other material on the Internet	printed journals	books	newspapers	teachers	supervisor	group members	teaching
22-10-2004									
C1				X	X		X	X	
C2		X		X					
C3				X	X		X	X	
C4				X	X		X	X	
19-11-2004									
C1				X			X	X	
C2				X	X			X	
C3				X	X		X	X	
C4		X							
17-12-2004									
C1		X	X	X	X		X	X	
C2		X		X	X		X	X	
C3				X	X				
C4				X			X	X	

B2.2 *Mark those sources(form) that you have used to find information (more x's are allowed)*

	the library at RSLIS	the library at RSLIS (online)	other libraries	other libraries (online)	opac	other databases	newsgroups	internet (www)	other 1	other 2	other 3
22-10-2004											
C1				X		X		X			
C2			X	X	X			X			
C3				X		X		X			
C4	X		X			X		X			
19-11-2004											
C1				X	X			X	X		
C2		X		X				X			
C3				X		X		X			
C4								X	X		
17-12-2004											
C1				X	X	X		X			
C2				X	X			X			
C3			X	X		X		X			
C4			X					X			

B2.3 *What relevance criteria do you use at the moment when assessing a document for use (subjective relevance). How important is the criteria (1=low; 3=high).* Only x's with value 2 and 3 are shown.

	document's layout	the source is relatively new	document seems to be thouroughly	document is giving an overview	language is clear and fluent	the source is respected	the author is acknowledged within	document is of scientific high value	other 1	other 2	other 3
22-10-2004											
C1			X	X		X	X	X			
C2		X	X	X			X				
C3			X			X	X	X			
C4		X	X								
19-11-2004											
C1			X	X				X			
C2		X	X	X			X				
C3		X	X			X	X	X			
C4		X	X								
17-12-2004											
C1		X				X		X	X		
C2		X	X	X	X						
C3			X		X	X	X				
C4			X					X			